TC-W320/W320S/WR520/WR520S

SERVICE MANUAL

US Model
TC-W320/W320S/WR520/WR520S

Canadian Model
AEP Model
E Model
TC-W320/WR520

UK Model
TC-W320

TC-WR520

SPECIFICATIONS

Recording system 4-track 2-channel stereo
Fast-forward and rewind time
Approx. 90 sec. (with HF-60 cassette)
Bias AC bias
Signal-to-noise ratio (NAB, at peak level)

Dolby NR switch / Cassette	OFF	B-TYPE ON	C-TYPE ON
TYPE IV (Sony METAL-ES)	58 dB	66 dB	73 dB
TYPE II (Sony UX-S)	57 dB	65 dB	72 dB
TYPE I (Sony HF-S)	55 dB	63 dB	70 dB

Total harmonic distortion
1.0% (with Sony METAL-ES cassette)
Frequency response (Dolby NR off)

TYPE IV cassette (Sony METAL-ES)	30 – 15,000 Hz (±3 dB) 30 – 13,000 Hz (0VU recording)
TYPE II cassette (Sony UX-S)	30 – 15,000 Hz (±3 dB)
TYPE I cassette (Sony HF-S)	30 – 14,000 Hz (±3 dB)

Wow and flutter 0.08% WRMS (NAB)
Inputs

Line inputs (phono jacks)	Sensitivity	77.5 mV (–20 dB)
	Input impedance	50 kohms

Outputs

Line outputs (phono jacks)	Rated output level	0.44 V (–5 dB) at a load impedance 47 kohms
	Load impedance	Over 10 kohms
Headphones (stereo phone jack)	Output level	0.3 mW at a load impedance of 32 ohms

Model Name Using Similar Mechanism			New Mechanism
Tape Transport Mechanism Type	TC-W320 /W320S	DECK A	TCM-190VA12
		DECK B	TCM-190VB22
	TC-WR520 /WR520S	DECK A	TCM-190RA12
		DECK B	TCM-190RB22

General
Power requirements US, Canadian model : 120V AC, 60Hz
AEP, West Germany model : 220V AC, 50/60Hz
UK model : 240V AC, 50/60Hz
E model : 120, 220, 240V AC adjustable, 50/60Hz
Power consumption 23 W
Dimensions Approx. 430 × 125 × 285 mm (w/h/d) (17 × 5 × 11¼ inches) including projecting parts and controls
Weight Approx. 4.5 kg (9 lbs 15 oz)

Supplied accessory
Audio connecting cord (2)

Design and specifications subject to change without notice.

Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.
"DOLBY" and the double-D symbol ▯▯ are trademarks of Dolby Laboratories Licensing Corporation.

STEREO CASSETTE DECK

SONY®

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety check before releasing the set to the customer:
Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microampers). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2 V AC range are suitable. (See Fig. A)

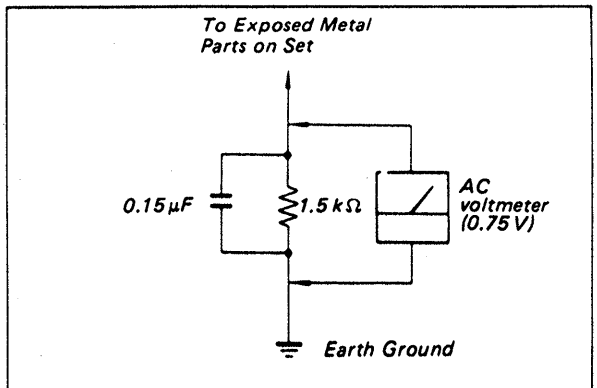
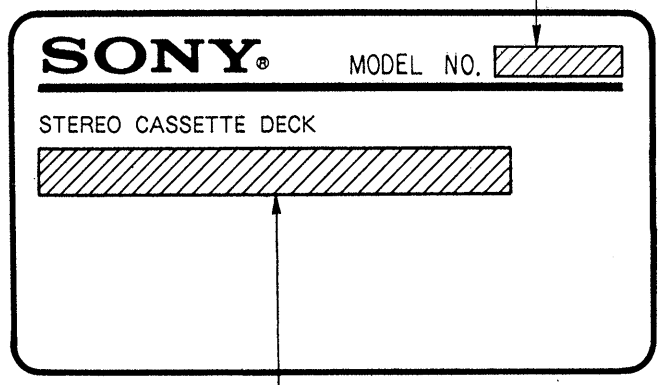


Fig. A. Using an AC voltmeter to check AC leakage.

MODEL IDENTIFICATION
(Specification Label)

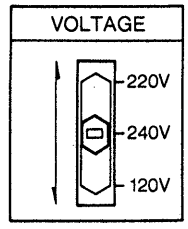
TC-W320
TC-W320S
TC-WR520
TC-WR520S



US, Canadian model: AC120V 60Hz 23W
UK model: AC240V ~50/60Hz
WG, AEP model: AC220V ~50/60Hz
E model: AC120, 220, 240V ~50/60Hz

Operating voltage
Operate the unit on either 120, 220 or 240 V AC, 50/60 Hz. Before connecting the unit to the power source, check that the operating voltage of your unit is the same as the local power line voltage.
The voltage selector is located on the rear panel. If the selector must be reset, disconnect the AC power cord and set the selector to the appropriate voltage.

VOLTAGE Selector



SAFETY-RELATED COMPONENT WARNING!!

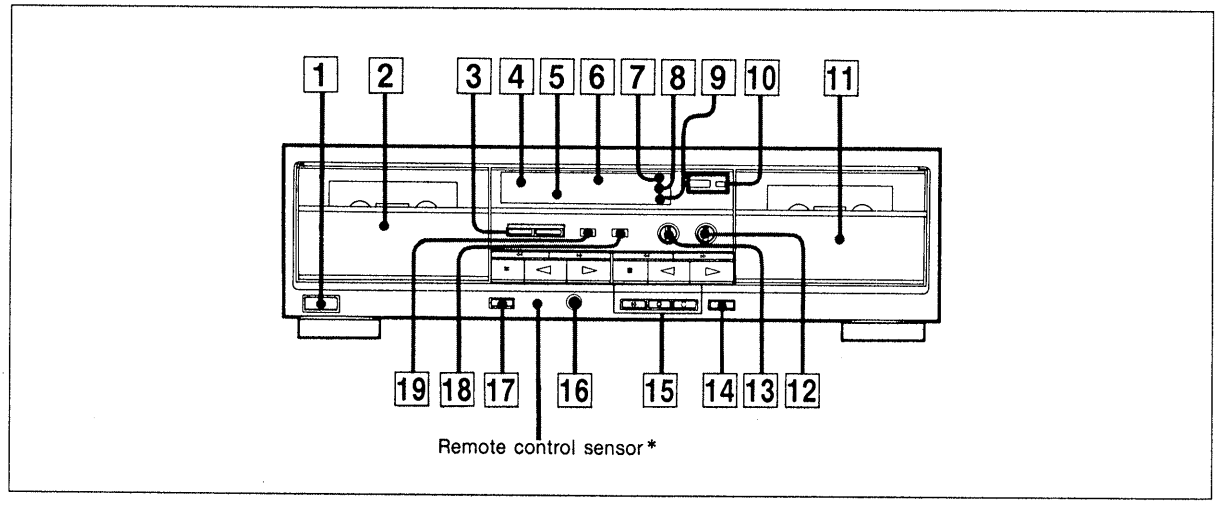
COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SECTION 1
GENERAL

Identification of Front Panel Parts



1 **POWER switch**

2 **Cassette holder (deck A)**

3 **SYNCHRO DUBBING buttons**
HIGH SPEED button/NORM (normal) SPEED button

4 **PLAY and ◁ ▷ Direction indicators (deck A)**

5 **Peak level meter**

6 **SYNCHRO DUBBING indicators**

7 **PLAY and ◁ ▷ Direction indicators (deck B)**

8 **II Pause indicator**

9 **REC (recording) indicator**

10 **Tape COUNTER and RESET button**

11 **Cassette holder (deck B)**

12 **REC (recording) LEVEL control**

13 **BALANCE control**

14 **⏏ (eject) button (deck B)**

15 **Tape operation buttons**
■ (stop) button
◀ (reverse play) button (TC-WR520/WR520S only)
▶ (forward play) button
▶▶ (right fast winding) button
◀◀ (left fast winding) button
● REC (recording) button (deck B only)
○ REC MUTE (recording muting) button (deck B only)
II PAUSE button (deck B only)

16 **PHONES (headphones) jack (stereo phone jack)**

17 **⏏ (eject) button (deck A)**

18 **DD NR (Dolby noise reduction) switch**

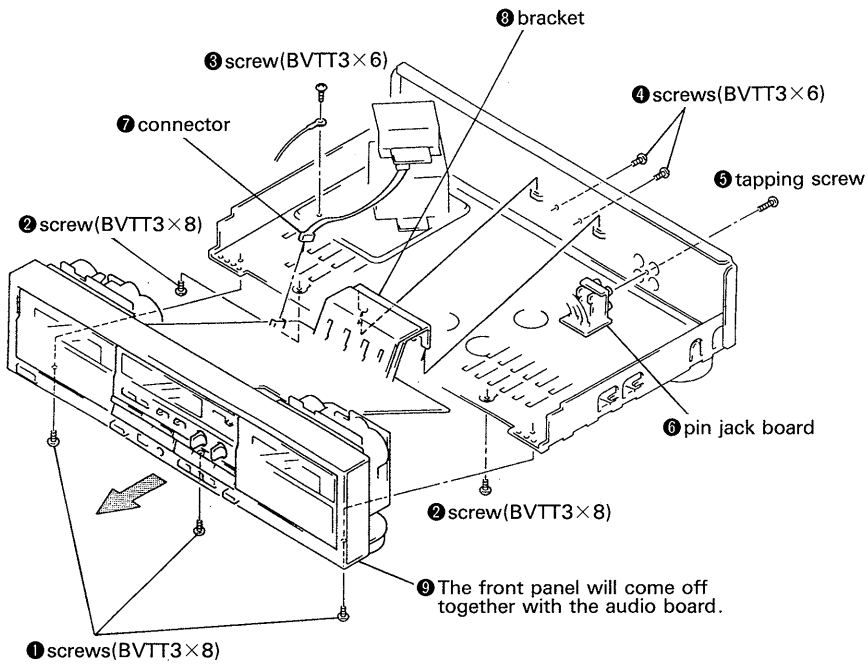
19 **DIR (direction) MODE switch (TC-WR520/WR520S only)**

*** Remote control sensor**
You can remotely control this cassette deck with:
— A remote commander that has an R mark and comes with a Sony amplifier or receiver and which can be used to control a cassette deck.
— An optional Sony remote commander that has an R mark.

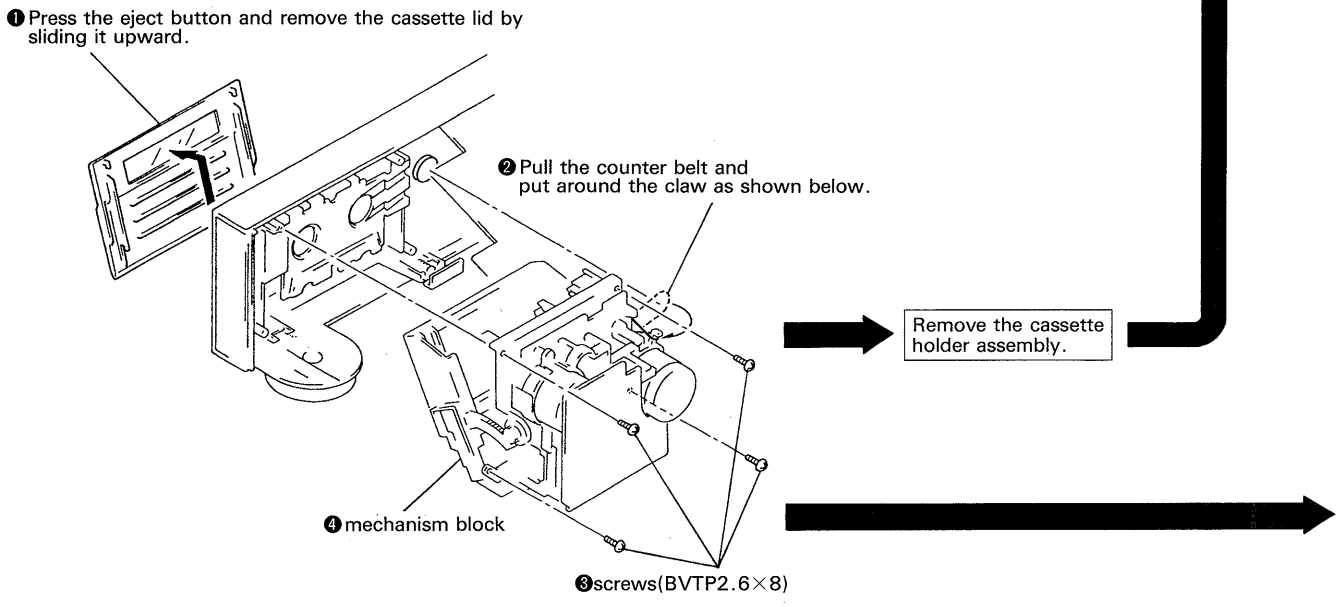
SECTION 2
DISASSEMBLY

Note : Follow the disassembly procedure in the numerical order given.

[FRONT PANEL]

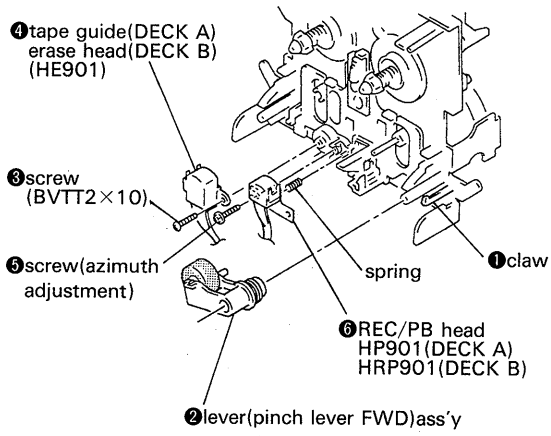


[MECHANISM BLOCK]

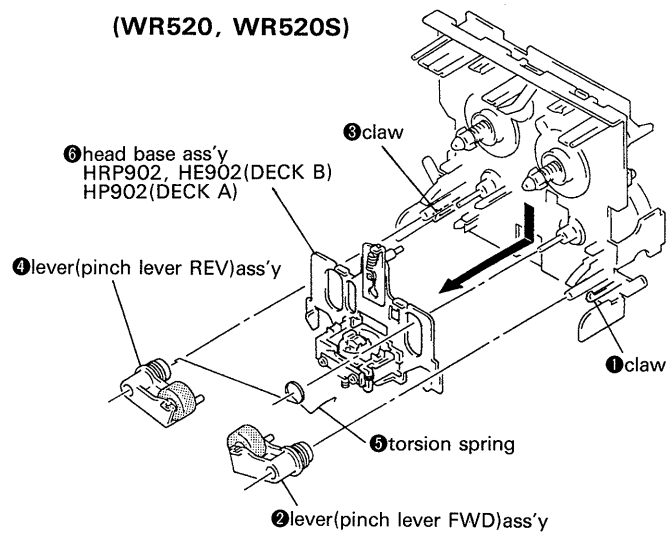

❶Press the eject button and remove the cassette lid by sliding it upward.
❷Pull the counter belt and put around the claw as shown below.
Remove the cassette holder assembly.
❹mechanism block
❸screws(BVTP2.6×8)

[HEAD]

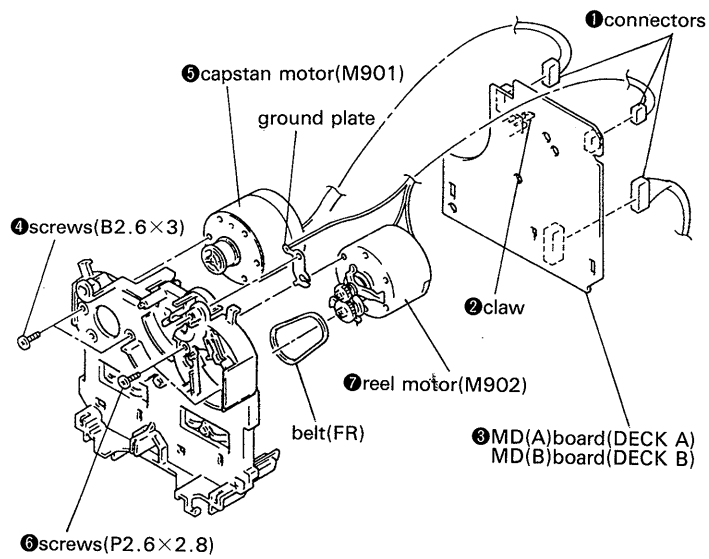
(W320, W320S)



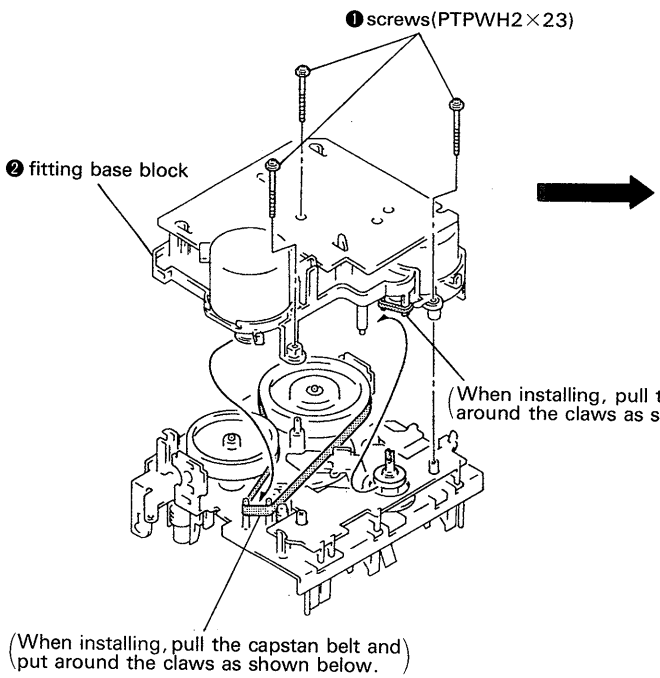
(WR520, WR520S)



[MOTOR]



[FITTING BASE BLOCK]


❶screws(PTPWH2×23)
❷ fitting base block
(When installing, pull the FR belt and put around the claws as shown below.)
(When installing, pull the capstan belt and put around the claws as shown below.)

SECTION 3
ADJUSTMENTS

3-1. MECHANICAL ADJUSTMENTS

PRECAUTION

1. Clean the following parts with a denatured-alcohol-moistened swab:
   record/playback head　　pinch roller
   erase head　　rubber belts
   capstan　　idler
2. Demagnetize the record/playback head with a head demagnetizer.
3. Do not use a magnetized screwdriver for the adjustments
4. After the adjustments, apply suitable locking compound to the parts adjusted.
5. The adjustments should be performed in the rated power supply voltage unless otherwise noted.

Torque Measurement

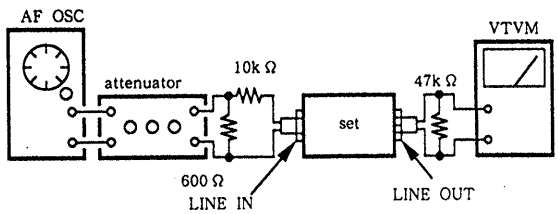
Torque	Torque meter	Meter reading
FWD	CQ-102C	35 to 60g • cm (0.49 to 0.83 oz • inch)
FWD Back tension	CQ-102C	1 to 5g • cm (0.014 to 0.06 oz • inch)
REV	CQ-102RC	35 to 60g • cm (0.49 to 0.83 oz • inch)
REV Back tension	CQ-102RC	1 to 5g • cm (0.014 to 0.06 oz • inch)
FF, REW	CQ-201B	70 to 110g • cm (0.98 to 1.52 oz • inch)

3-2. ELECTRICAL ADJUSTMENT

Note: The adjustment should be performed in the order given in the service manual. As a rule, adjustment about playback should be performed before adjustment about recording.
The adjustments should be performed for both L-CH and R-CH.

- Switches and controls should be set as follows unless otherwise specified.
  DD NR switch : OFF
  DIR MODE switch : ⇄
- Standard Record:
  Deliver the standard input signal level to the input jack and set the REC LEVEL control to obtain the standard output signal level.

– Record Mode –



Standard Input Level

input terminal	LINE IN
source impedance	10kΩ
input level	0.25V (−10dB)

Standard Output Level

output terminal	LINE OUT
load impedance	47kΩ
output level	0.44V (−5dB)

Test tape

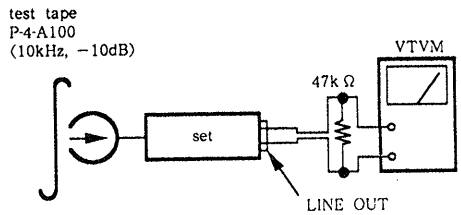
Type	Signal	Used for
P-4-A100	10kHz, −10dB	Azimuth Adjustment
P-4-L300	315Hz, 0dB	PB Level Adjustment
WS-48B	3kHz, 0dB	Tape Speed Adjustment

Record/Playback Head Azimuth Adjustment

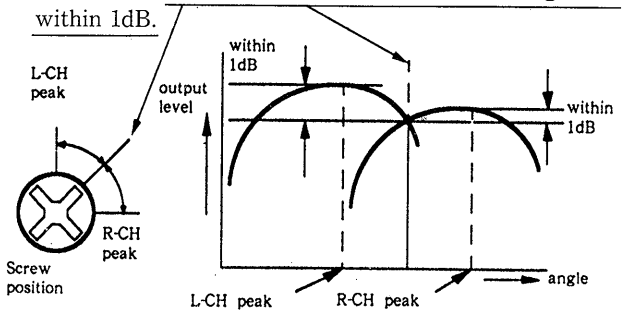
DECK A　DECK B

Procedure:

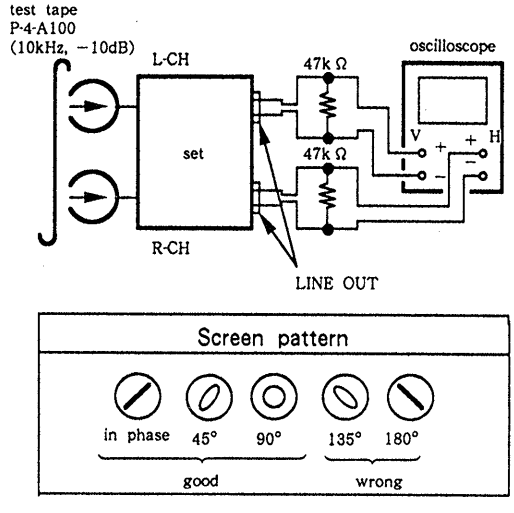
1. Mode: FWD playback



2. Turn the adjustment screw for the maximum output levels. If these levels do not match, turn the adjustment screw until both of output levels match together within 1dB.



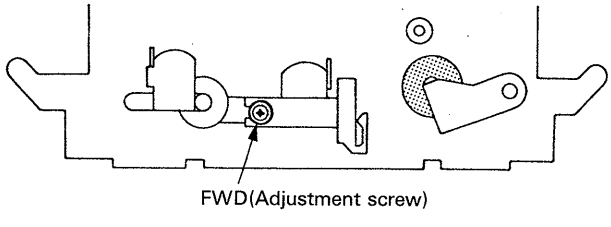
3. Phase Check
Mode: playback



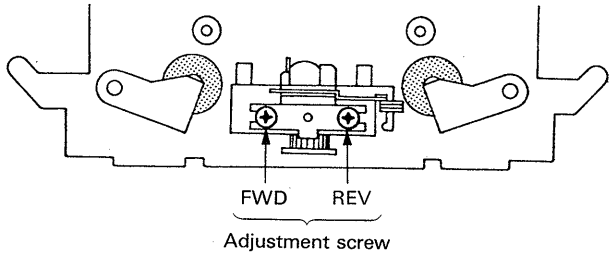
4. Set in the REV mode and repeat the step 1-3. (WR520)
5. After the adjustment, lock the screws with locking compound.

Adjustment Location: Record/playback head

TC-W320/W320S

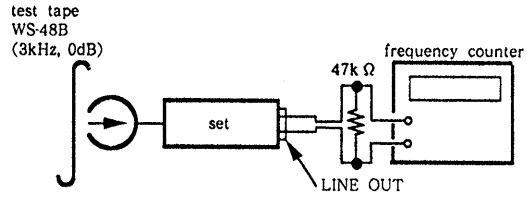


TC-WR520/WR520S



Tape Speed Adjustment DECK A DECK B

Procedure:
Mode: playback



Perform high speed adjustment before normal speed adjustment.

(high speed adjustment)
1. Short test pin CN805 on audio board and turn POWER switch on.
2. Set to FWD playback mode.
3. Keep on pressing the HIGH SPEED DUBBING switch.
4. Adjust RV72A, B so that the frequency counter reading becomes 6,000±20Hz.
5. After adjustment, disconnect CN805 shorted in step 1.

(normal speed adjustment)
1. Set to FWD playback mode.
2. Adjust RV71A, B so that the frequency counter reading becomes 3,000±10Hz.

Frequency difference between the beginning and the end of the tape should be within 3%.
Frequency difference between deck A and deck B the beginning of the tape should be within 1.5%.

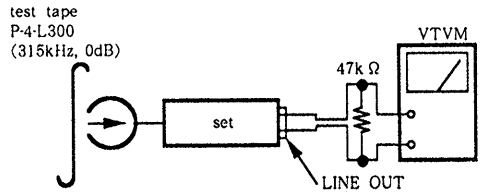
Adjustment Location:
MD(A), MD(B) board

Playback Level Adjustment

DECK A DECK B

Procedure :

Mode: playback



Adjust RV11A, B (L-CH), RV21A, B (R-CH) so that the reading on VTVM meets the adjustment limits below.

Adjustment Limits :

LINE OUT level: −5±0.5dB (0.42−0.46V)

Level difference between channels: less than 0.5dB

Check that the LINE OUT level does not change in playback mode while changing the mode from playback to stop several times.

Adjustment Location : MD(A), MD(B) board

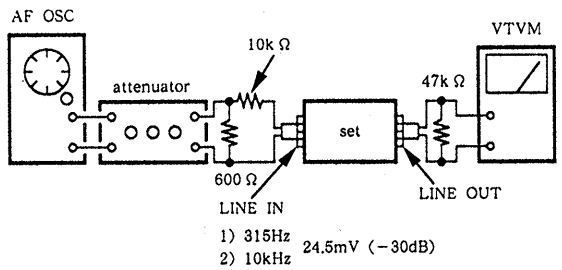
Record Bias Adjustment DECK B

Setting :

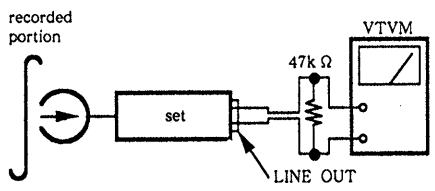
REC LEVEL control: Standard Record (See page 6.)

Procedure :

1. Mode: record



2. Mode: playback



Playback the signal recorded in step 1.
Confirm that the 10kHz playback output is 0±0.5dB relative to the 315Hz output. If necessary, adjust RV12 (L-CH), RV22 (R-CH) and repeat the steps given above.

Adjustment Location : MD(A), MD(B) board

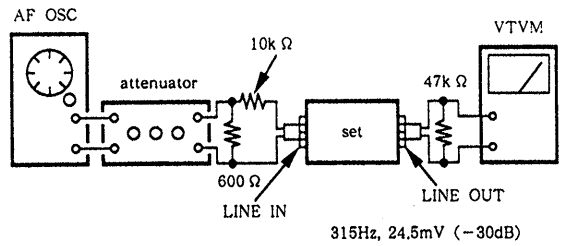
Record Level Adjustment DECK B

Setting :

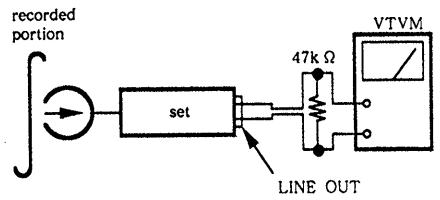
REC LEVEL control: Standard Record (See page 6.)

Procedure :

1. Mode: record



2. Mode: playback



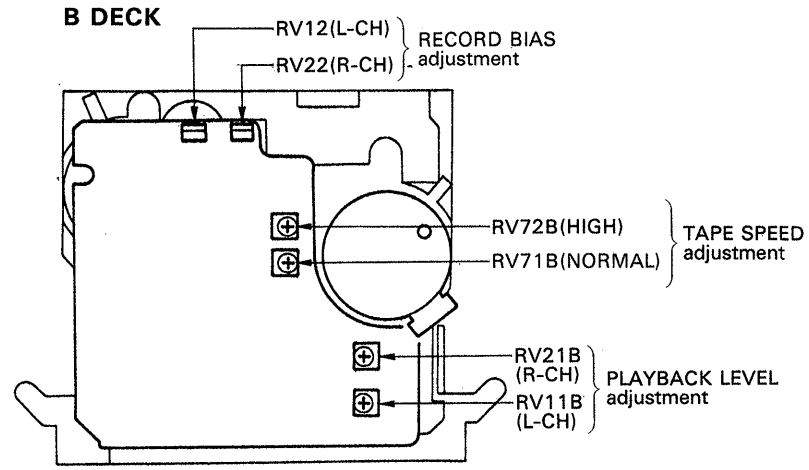
3. Playback the signal recorded in step 1.
Confirm that the signal level is within the adjustment limits below. If necessary, adjust RV101 (L-CH), RV 201 (R-CH) and repeat the step1-2.

Adjustment Limits : −25dB±0.5dB (42−46mV)

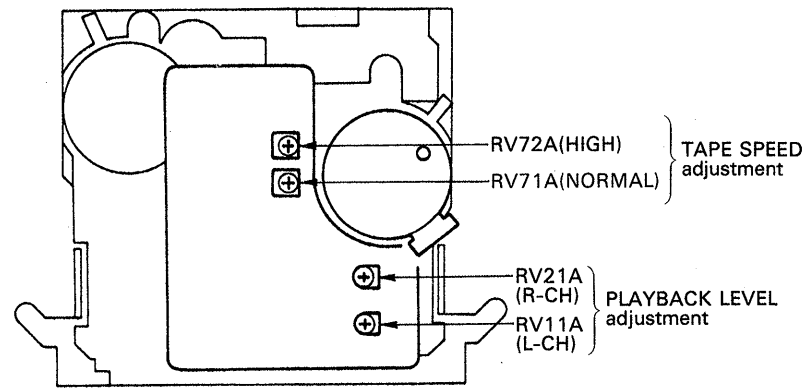
Adjustment Location : audio board (component side)

−Adjustment Parts Location Diagrams−

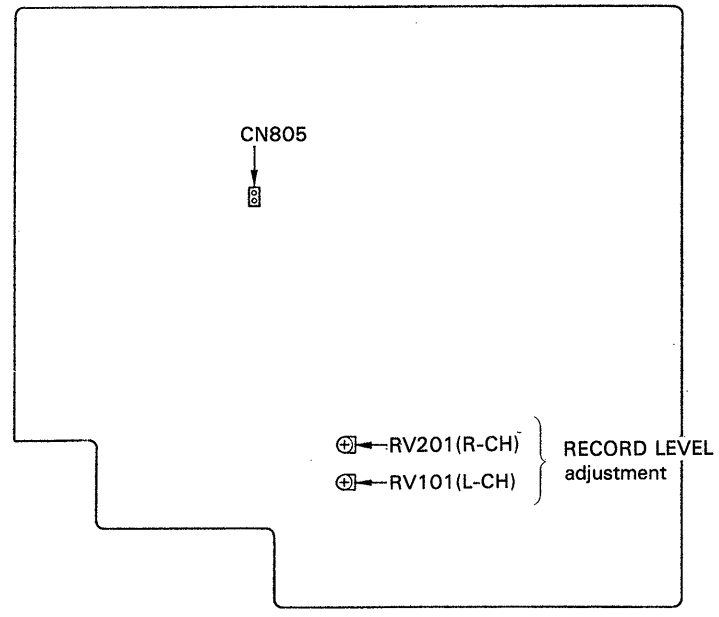
B DECK



A DECK



AUDIO BOARD (COMPONENT SIDE)



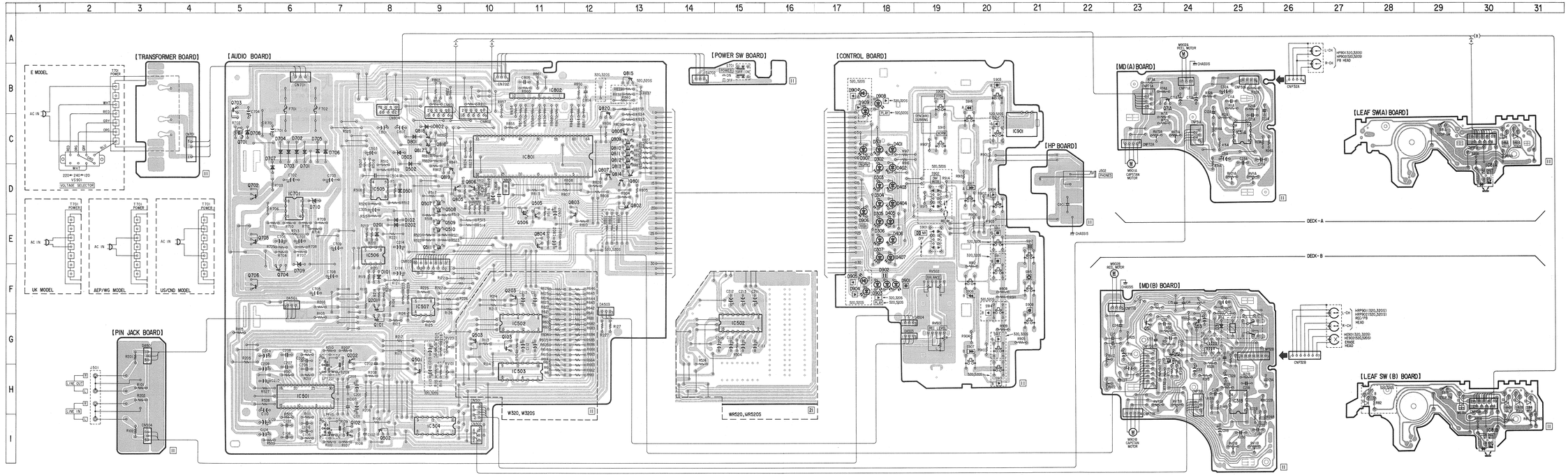
SECTION 4
DIAGRAMS

●SEMICONDUCTOR LOCATION

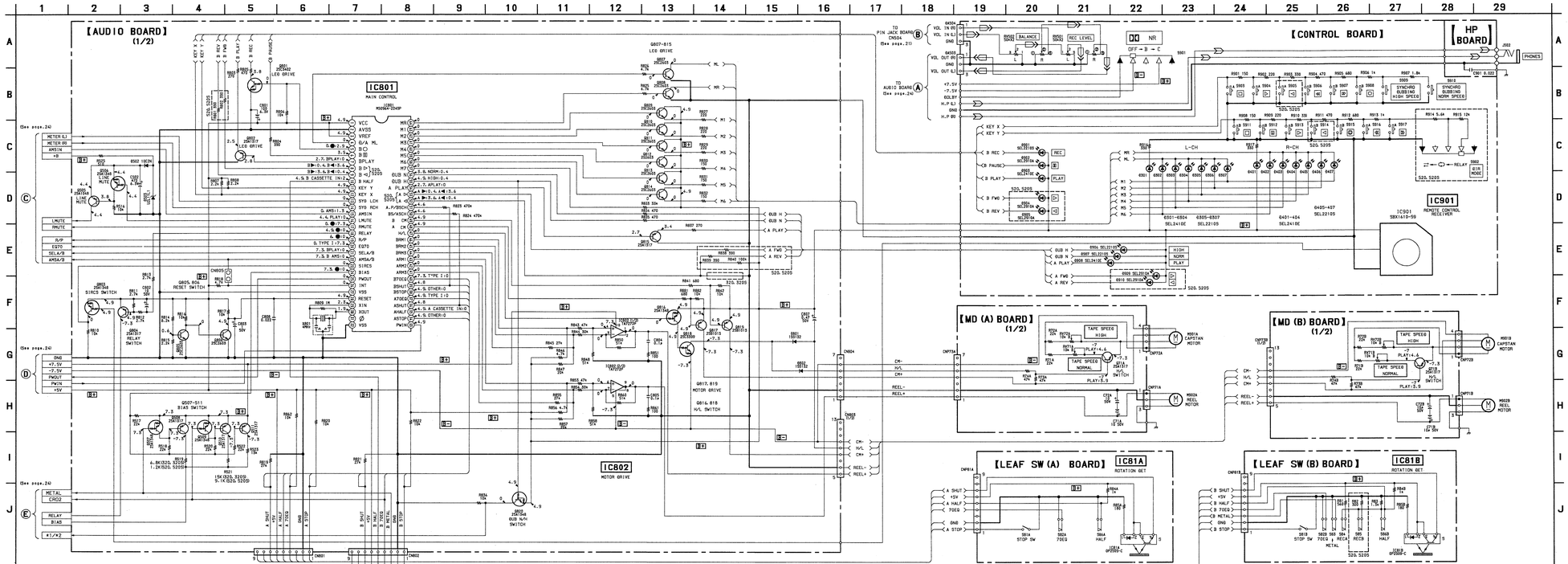
Ref. No.	Location	Ref. No.	Location
D31	G-25	IC507	F-9
D101	F-8	IC701	D-6
D102	E-8	IC801	C-11
D201	E-8	IC802	B-11
D202	E-8	IC901	C-21
D301	C-18		
D302	D-18	Q71A	B-24
D304	D-18	Q71B	G-24
D305	E-18	Q51	G-23
D306	E-18	Q52	G-24
D307	E-18	Q53	G-24
D401	C-18	Q101	G-8
D402	D-18	Q102	I-8
D403	D-18	Q103	G-10
D404	D-18	Q201	F-8
D405	E-18	Q202	G-7
D406	E-18	Q203	F-10
D407	E-18	Q501	H-9
D501	D-8	Q502	I-8
D502	C-8	Q503	G-10
D503	C-8	Q505	D-11
D701	C-6	Q506	D-11
D702	C-6	Q507	D-9
D703	C-6	Q508	D-9
D704	C-6	Q509	E-9
D705	C-7	Q510	E-9
D706	C-7	Q511	E-9
D707	D-6	Q701	C-5
D708	C-5	Q702	D-5
D709	E-6	Q703	B-5
D710	D-6	Q704	F-6
D801	C-8	Q705	E-5
D802	C-9	Q706	F-5
D901	F-18	Q801	D-13
D902	F-18	Q802	D-13
D903	F-18	Q803	D-12
D904	F-17	Q804	E-11
D905	F-17	Q805	D-9
D906	D-18	Q806	D-10
D907	C-18	Q807	D-12
D908	B-18	Q808	C-13
D909	B-17	Q809	C-13
D910	B-17	Q810	C-13
		Q811	C-13
IC31A	C-25	Q812	C-13
IC31B	H-25	Q813	D-13
IC81A	D-30	Q814	D-13
IC81B	I-30	Q815	B-13
IC501	H-6	Q816	C-9
IC502	G-11	Q817	C-9
IC503	H-11	Q818	C-9
IC504	I-9	Q819	D-9
IC505	D-8	Q820	B-12
IC506	E-8		

Note:
- ○——○ : parts extracted from the component side.
- ●——● : parts extracted from the conductor side.
- ⊏⊐ : Indicates side identified with part number.
- CND : Canadian model
  WG : West Germany model

4-1. PRINTED WIRING BOARDS



4-2. SCHEMATIC DIAGRAM —System Control Section—

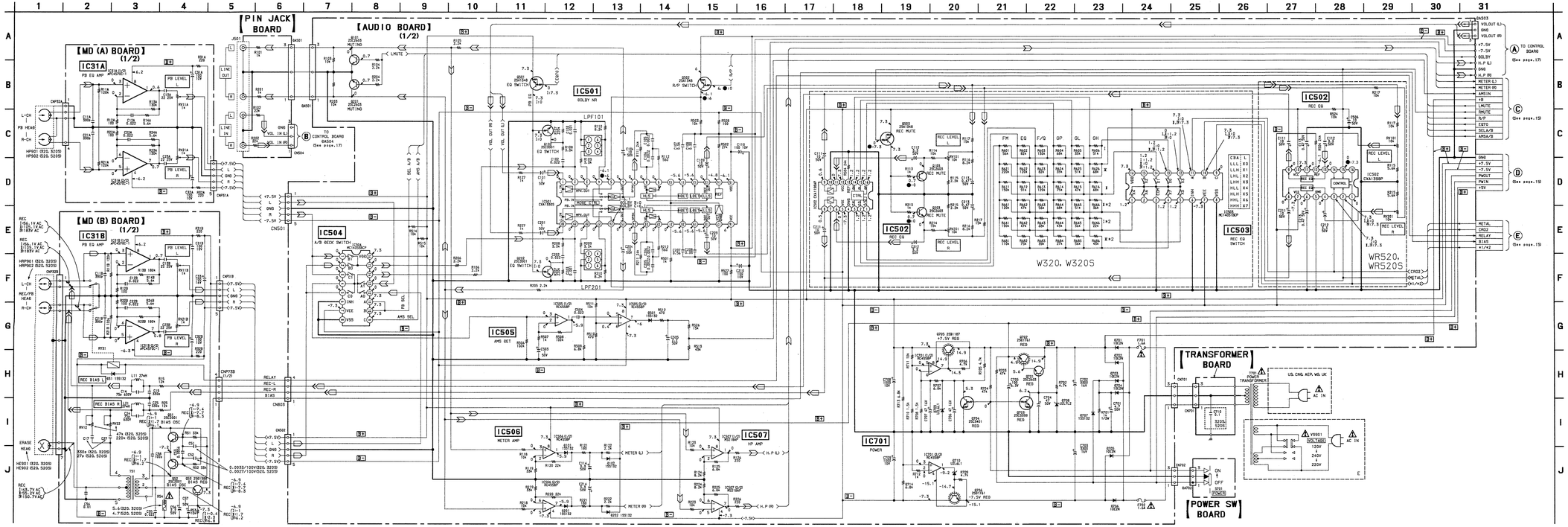


Note:

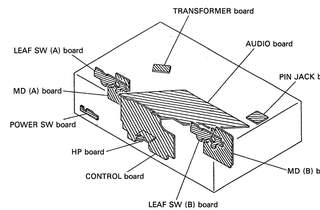
- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and ¼W or less unless otherwise specified.
- % : indicates tolerance.
- : fusible resistor.

Note:	**Note:**
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- : adjustment for repair.
- Voltage and waveforms are dc with respect to ground under no-signal
  no mark : STOP
  ▶ : FWD
  ◀ : REV
  ● : REC
- Voltages are taken with a VOM (Input impedance 10MΩ) Voltage variations may be noted due to normal production tolerances.
- Signal path.
  : PB (DECK A)
  : PB (DECK B)
  : REC (DECK B)
- CND : Canadian model
  WG : West Germany model

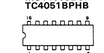


4-4. CIRCUIT BOARDS LOCATION

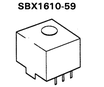


4-5. SEMICONDUCTER LEAD LAYOUTS

CXA1198AP
CXA1398P
MC14053BCP
TC4051BPHB

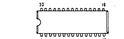


SBX1610-59



10E2N

CXA1330S



2SA1317-STU
2SC2603
DTA114ES
DTC143TS
DTC144WS
DTC144ES

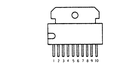
1SS202-1
HZS6A1L
UZL-11L1
UZS6B1L

M5218AP
RC4558P

2SB1013-4

SEL2210S-C
SEL2410E-D
SEL2810A-C

TA7272P



2SB1187-EF
2SD1761-EF

SECTION 5
EXPLODED VIEWS

NOTE:

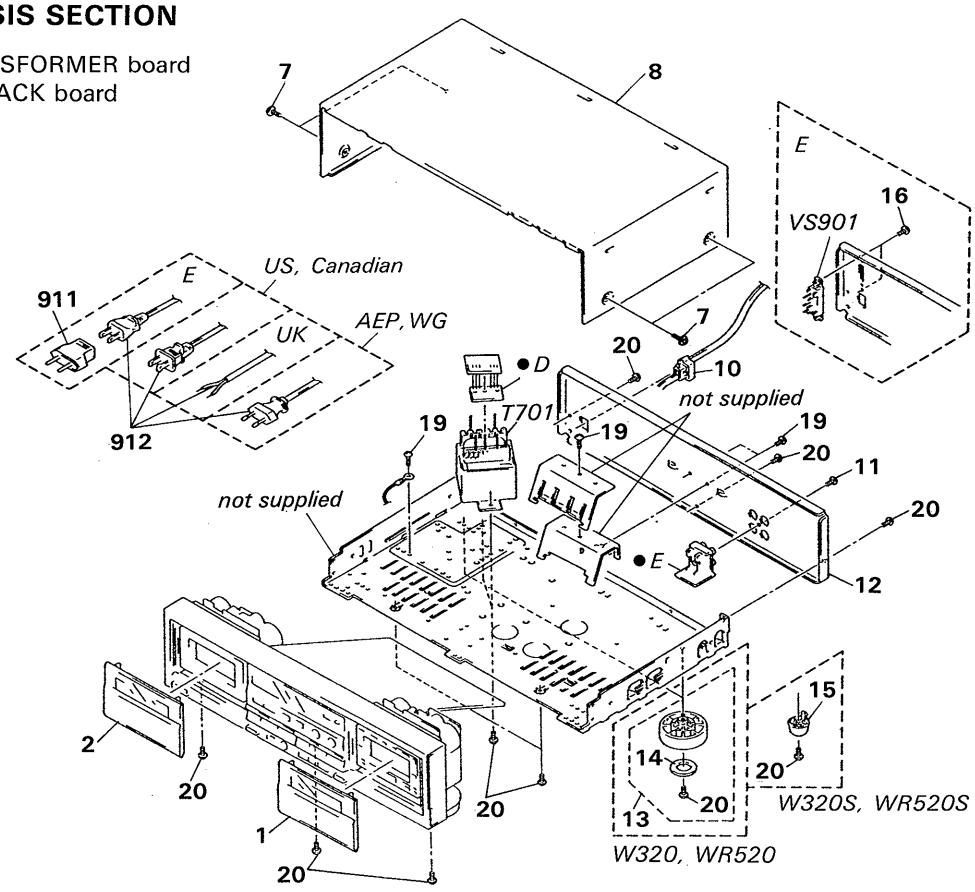
- The mechanical parts with no reference number in the exploded views are not supplied.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked "★" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part number suffix -XX and -X may be different from the parts specified in the components used on the set.
- Color Indication of Appearance Parts Example:
  (RED) . . . KNOB, BALANCE (WHITE)
  ↑ ↑
  Cabinet's Color Parts' Color
- WG: West Germany model

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifé.

5-1. CHASSIS SECTION

- ●*D*: TRANSFORMER board
- ●*E*: PIN JACK board

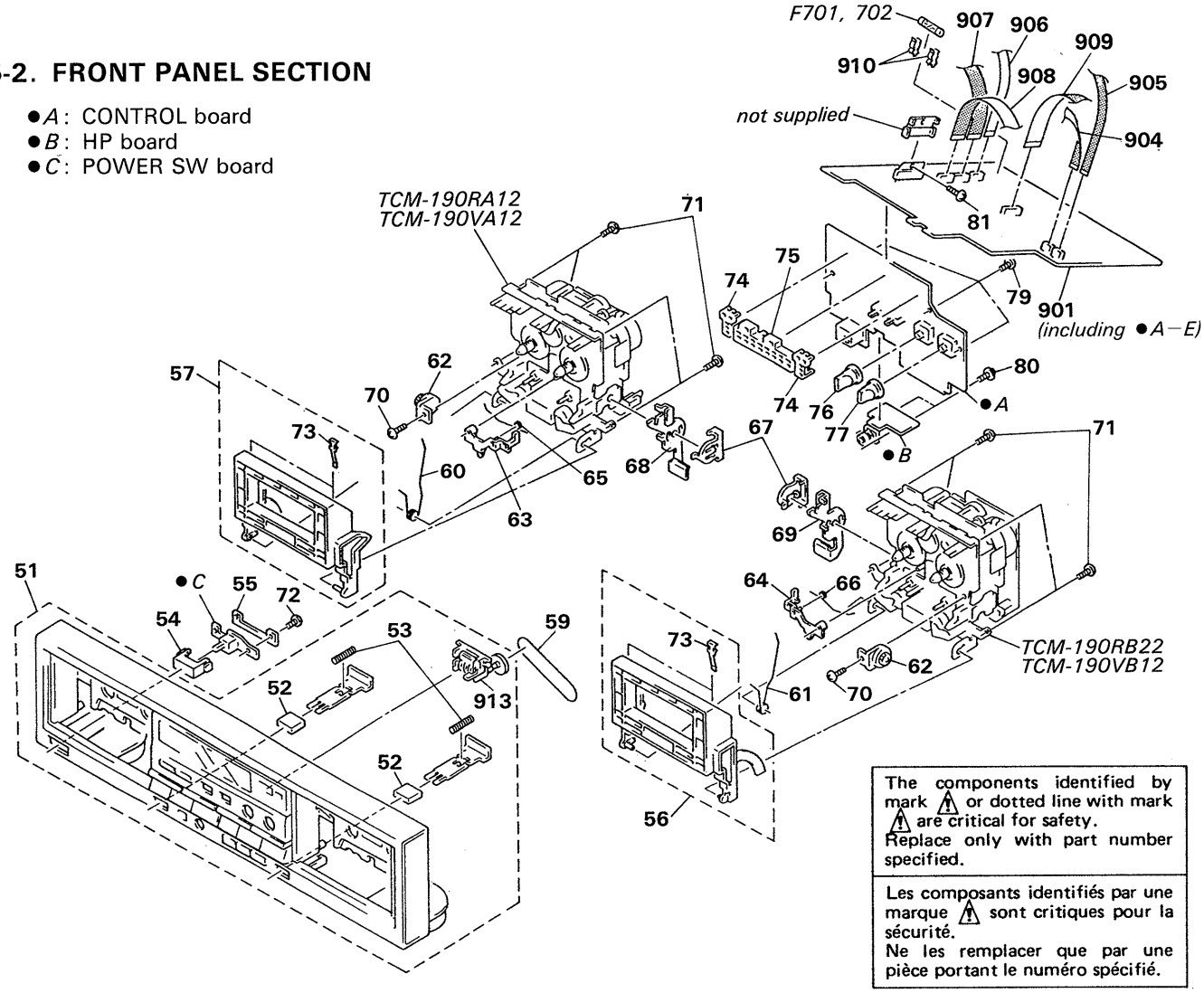


No.	Part No.	Description	Remarks
1	3-359-914-11	(520,520S)...LID, CASSETTE (DECK B)	
	3-359-914-31	(320,320S)...LID, CASSETTE (DECK B)	
2	3-359-914-01	(520,520S)...LID, CASSETTE (DECK A)	
	3-359-914-21	(320,320S)...LID, CASSETTE (DECK A)	
7	3-704-366-01	SCREW (CASE) (M3X8)	
8	3-332-578-61	CASE	
10	*3-703-244-00	(AEP,WG,UK).....BUSHING (2104), CORD	
	*3-703-571-11	(US,Canadian,E)..BUSHING (S)(4516), CORD	
11	7-621-849-00	SCREW, TAPPING	
12	*3-354-941-01	(520:US,Canadian)...PANEL, BACK	
	*3-354-941-21	(520:AEP,WG).....PANEL, BACK	
	*3-354-941-31	(520:E).....PANEL, BACK	
	*3-354-941-41	(520S).....PANEL, BACK	
	*3-354-942-01	(320:US,Canadian)...PANEL, BACK	
	*3-354-942-11	(320:UK).....PANEL, BACK	
	*3-354-942-31	(320:AEP,WG).....PANEL, BACK	
	*3-354-942-41	(320:E).....PANEL, BACK	
	*3-354-942-51	(320S).....PANEL, BACK	

No.	Part No.	Description	Remarks
13	X-4885-950-1	(320:US,Canadian,520:US,Canadian)	
		...FOOT ASSY	14
	X-3304-938-2	(320:E,AEP,WG,UK,520:E,AEP,WG)	
		...FOOT ASSY	14
14	4-923-836-11	(320,520)...CUSHION	
15	4-930-848-01	(320S,520S)...FOOT	
16	7-685-534-19	(E)...SCREW +BVTP 2.6X8 TYPE2 N-S	
19	7-682-547-04	SCREW +BVTT 3X6 (S)	
20	7-682-548-09	SCREW +BVTT 3X8 (S)	
911	⚠1-569-007-11	(E)...ADAPTOR, CONVERSION 2P	
912	⚠1-551-188-XX	(E).....CORD, POWER	
	⚠1-551-506-XX	(US,Canadian)...CORD, POWER	
	⚠1-555-795-00	(AEP,WG).....CORD, POWER,EULO PLUG	
	⚠1-556-035-00	(UK).....CORD, POWER	
T701	⚠1-449-661-21	(AEP,WG,UK)...TRANSFORMER, POWER	
T701	⚠1-449-666-21	(E).....TRANSFORMER, POWER	
T701	⚠1-449-420-21	(US,Canadian)...TRANSFORMER, POWER	
VS901	⚠1-570-307-11	(E)....SWITCH, VOLTAGE CHANGE (VOLTAGE)	

5-2. FRONT PANEL SECTION

- ●*A*: CONTROL board
- ●*B*: HP board
- ●*C*: POWER SW board



The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

No.	Part No.	Description	Remarks
51	X-3346-306-1	(520:E,AEP,WG) ...PANEL ASSY, FRONT	52,53,913
	X-3346-307-1	(320:US,Canadian,320S) ...PANEL ASSY, FRONT	52,53,913
	X-3346-308-1	(320:E,AEP,WG,UK) ...PANEL ASSY, FRONT	52,53,913
	X-3346-309-1	(520:US,Canadian,520S) ...PANEL ASSY, FRONT	52,53,913
52	3-359-907-01	BUTTON (EJECT)	
53	3-359-906-01	SPRING, COMPRESSION	
54	3-354-932-01	BUTTON (POWER)	
55	3-359-910-01	REINFORCEMENT	
56	X-3340-194-1	HOLDER (L) ASSY, CASSETTE	73
57	X-3340-195-1	HOLDER (R) ASSY, CASSETTE	73
59	3-305-524-00	BELT	
60	3-354-960-01	SPRING (LOADING R), TORSION	
61	3-354-959-01	SPRING (LOADING L), TORSION	
62	3-354-963-01	DAMPER	
63	3-354-956-01	LEVER (EJ SAFTY LEVER R)	
64	3-354-955-01	LEVER (EJ SAFTY LEVER L)	
65	3-354-962-01	SPRING (EJ SAFTY SPRING R)	
66	3-354-961-01	SPRING (EJ SAFTY SPRING L)	
67	3-354-957-01	JOINT (LOCK LEVER)	
68	*3-354-954-01	LEVER (LOCK LEVER R)	
69	*3-354-953-01	LEVER (LOCK LEVER L)	
70	7-621-773-95	SCREW +BVTT 2.6X6 (S)	
71	4-928-635-01	SCREW, +BV (2.6X8) TAPPING	
72	4-928-635-21	SCREW, +BV (2.6X10) TAPPING	
73	3-308-823-11	SPRING	

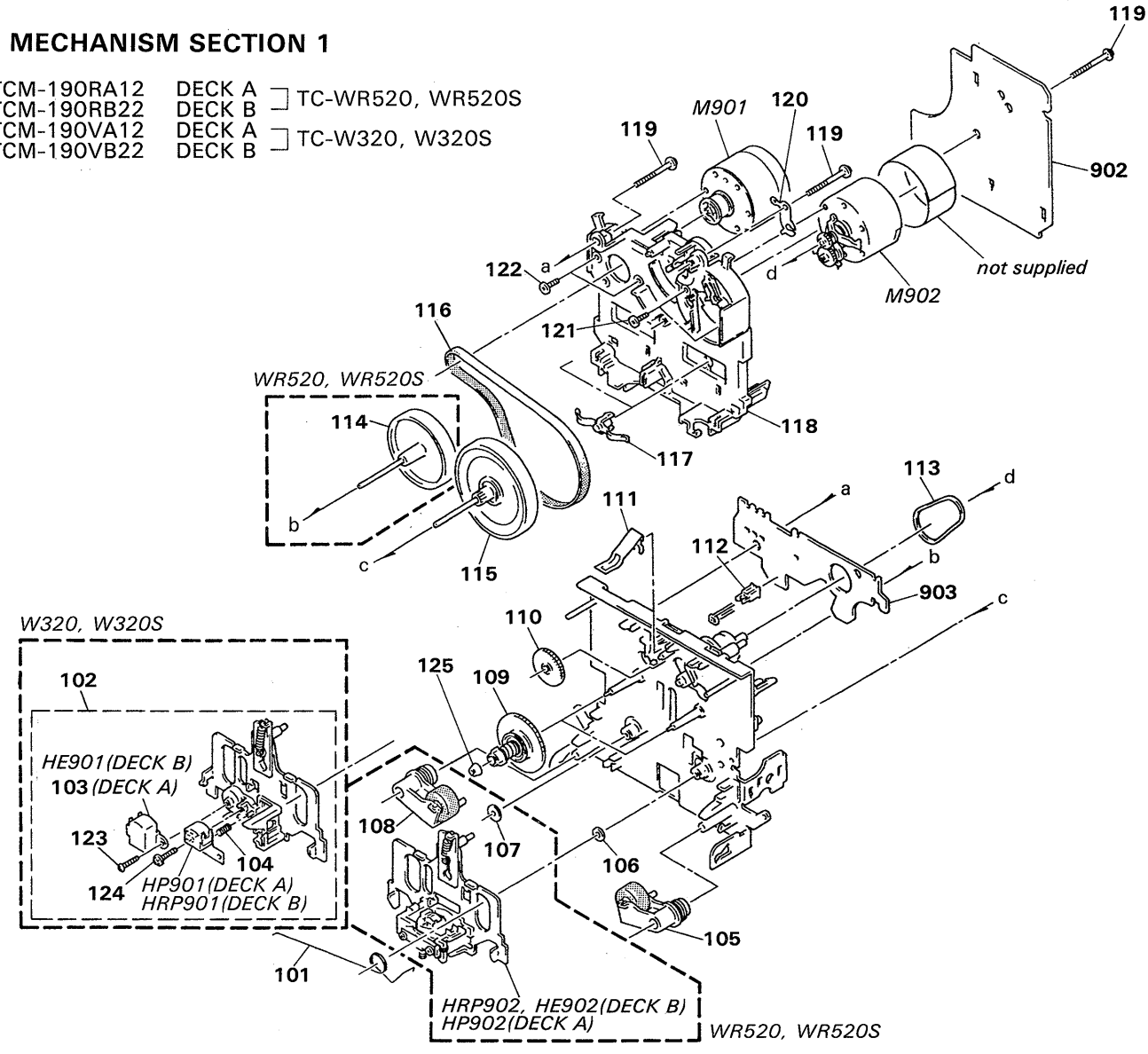
No.	Part No.	Description	Remarks
74	*3-354-966-01	HOLDER (DIR), LED	
75	*3-354-972-01	HOLDER (METER), LED	
76	3-354-968-01	KNOB (RT)(BALANCE)	
77	3-354-968-11	KNOB (RT)(REC LEVEL)	
79	4-928-635-01	SCREW, +BV (2.6X8) TAPPING	
80	7-685-134-19	SCREW (+ PTPWH)(2.6X8)	
81	7-682-547-04	SCREW +BVTT 3X6 (S)	
901	*A-2006-250-A	(320)....MOUNTED PCB, AUDIO	
	*A-2006-251-A	(520)....MOUNTED PCB, AUDIO	
	*A-2006-301-A	(520S)...MOUNTED PCB, AUDIO	
	*A-2006-302-A	(320S)...MOUNTED PCB, AUDIO	
904	1-575-847-11	WIRE, FLAT TYPE (5 CORE)	
905	1-575-779-11	WIRE, FLAT TYPE (5 CORE)	
906	1-575-968-11	WIRE, FLAT TYPE (7 CORE)	
907	1-575-781-11	WIRE, FLAT TYPE (9 CORE)	
908	1-575-782-11	WIRE, FLAT TYPE (9 CORE)	
909	1-575-784-11	WIRE, FLAT TYPE (13 CORE)	
910	1-533-213-31	HOLDER, FUSE	
913	1-548-596-31	COUNTER, TAPE (MIDDLE TYPE)	
F701	⚠1-532-259-00	(E,AEP,WG,UK)...FUSE, TIME-LAG 1.6A	
F701	⚠1-532-742-11	(US,Canadian)...FUSE, GLASS TUBE 1.6A	
F702	⚠1-532-259-00	(E,AEP,WG,UK)...FUSE, TIME-LAG 1.6A	
F702	⚠1-532-742-11	(US,Canadian)...FUSE, GLASS TUBE 1.6A	

5-3. MECHANISM SECTION 1

- ●TCM-190RA12 DECK A
- ●TCM-190RB22 DECK B
- ●TCM-190VA12 DECK A
- ●TCM-190VB22 DECK B

TC-WR520, WR520S

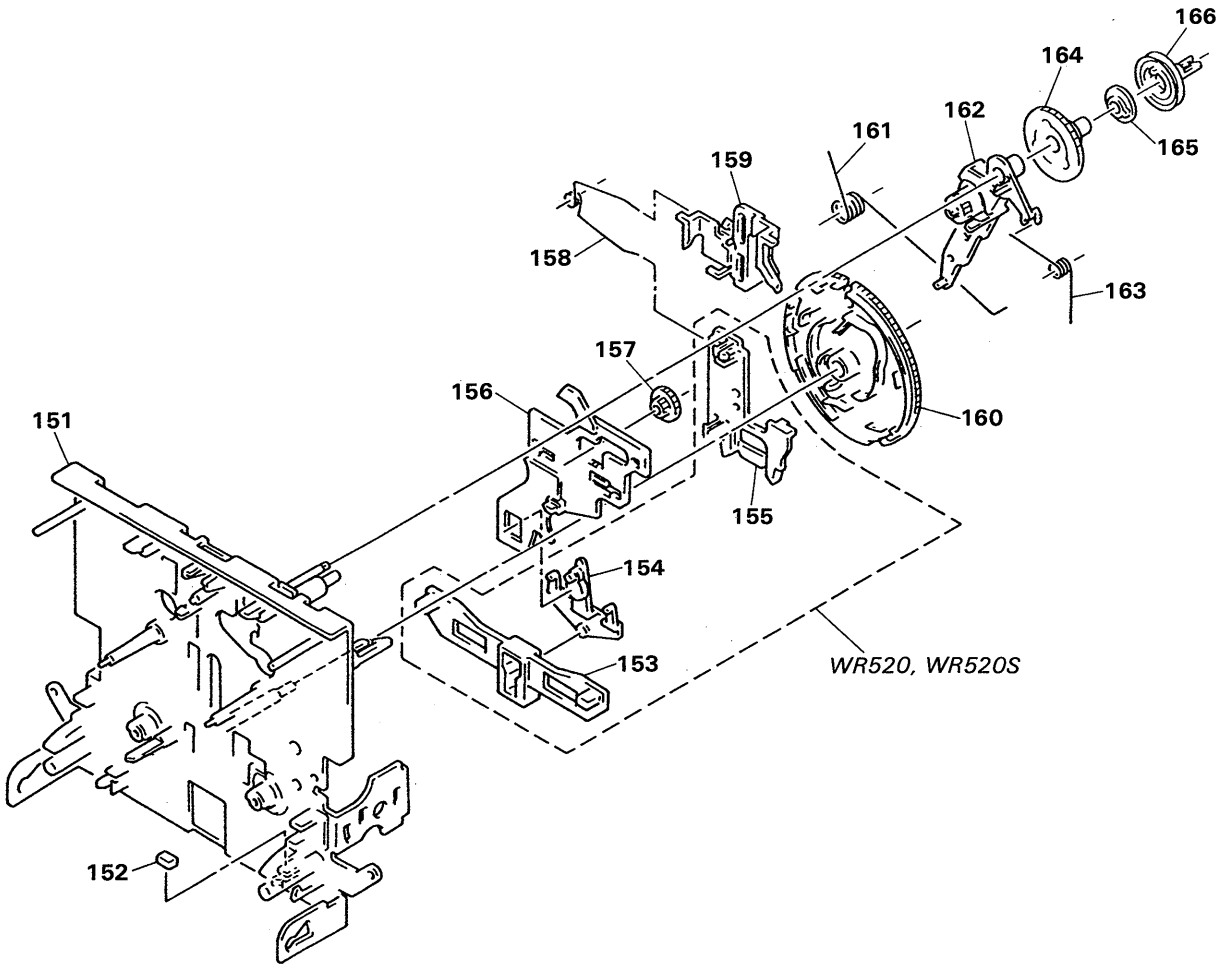
TC-W320, W320S



No.	Part No.	Description	Remarks
101	3-359-455-01	SPRING, TORSION	
102	A-2003-475-A	(320,320S DECK A)...BASE(ONE) ASSY, HEAD	
	A-2003-476-A	(320,320S DECK B)...BASE(ONE) ASSY, HEAD	
103	3-319-716-01	(320,320S DECK A)...GUID, TAPE	
104	3-343-484-01	(320,320S)...SPRING, COMPRESSION	
105	X-3359-408-1	LEVER (PINCH LEVER FWD) ASSY	
106	3-356-713-01	WASHER	
107	3-356-714-01	(520,520S)...WASHER	
108	X-3359-409-1	(520,520S)...LEVER(PINCH LEVER REV) ASSY	
109	X-3359-404-1	TABLE ASSY, REEL	
110	3-359-424-01	GEAR (REV GEAR)	
111	3-359-430-01	SPRING(CASSETTE RETAINER),LEAF	
112	3-343-419-01	HOLDER (S SENSOR A)	
113	3-359-466-01	BELT (FR), SQUARE	
114	X-3359-410-1	(520,520S)...FLYWHEEL (REV) ASSY	
115	X-3359-406-1	FLYWHEEL (FWD) COMPLETE ASSY	
116	3-359-417-01	(520,520S)...BELT (FLAT), CAPSTAN	
	3-359-467-01	(320,320S)...BELT (1 WAY FLAT BELT)	
117	3-575-321-00	RETAINER, THRUST, CAPSTAN	
118	*3-359-436-01	BASE (THRUST RETAINER),FITTING	
119	3-359-414-01	SCREW (+PTPWH 2X23)	

No.	Part No.	Description	Remarks
120	3-359-450-01	PLATE, GROUND	
121	7-627-556-08	SCREW +P 2.6X2.8	
122	7-621-775-00	SCREW +B 2.6X3	
123	7-621-255-65	(320,320S).....+BVTT 2X10 (S)	
124	3-359-446-01	SCREW(AZIMUTH ADJUSTMENT)	
125	3-356-618-01	CAP(REEL)	
902	*1-634-840-11	(DECK A)...PC BOARD, MD (A)	
	*1-634-843-11	(DECK B)...PC BOARD, MD (B)	
903	*1-634-841-11	PC BOARD, LEAF SW	
HE901	1-543-535-11	(320,320S DECK B)...HEAD, MAGNETIC (ERASE)	
HP901	1-543-536-11	(320,320S DECK A)...HEAD, MAGNETIC (PLAYBACK)	
HP902	A-2003-418-A	(520,520S DECK A)...BASE ASSY, HEAD	
HRP901	1-543-537-11	(320,320S DECK B)...HEAD, MAGNETIC (REC/PB)	
HE902 HRP902	A-2003-477-A	(520,520S DECK B)...BASE ASSY, HEAD (REC/PB/ERASE)	
M901	X-3359-417-1	MOTOR ASSY	
M902	A-2003-474-A	MOTOR (REEL MOTOR) ASSY	

5-4. MECHANISM SECTION 2



No.	Part No.	Description	Remarks
151	X-3359-415-1	(520,520S)...CHASSIS ASSY, MECHANICAL	
	X-3359-416-1	(320,320S)...CHASSIS ASSY, MECHANICAL	
152	3-359-469-01	SPACER	
153	*3-359-425-01	(520,520S)...SLIDER (REVERSE SLIDER)	
154	3-359-426-01	(520,520S)...LEVER (REVERSE LEVER)	
155	*3-359-427-01	(520,520S)...SLIDER (LEVERSE SLIDER)	
156	*3-359-415-01	SLIDER (TRIGGER SLIDER)	
157	3-359-448-01	GEAR (TRIGGER)	
158	3-359-454-01	SPRING, TORSION	
159	3-359-429-01	SLIDER (BRAKE PLATE)	
160	3-359-420-01	GEAR (CAM GEAR)	
161	3-359-456-01	SPRING(TRIGGER SPRING),TORSION	
162	X-3359-405-1	LEVER (FR ARM) ASSY	
163	3-359-453-01	SPRING (FR ARM), TORSION	
164	3-359-419-01	GEAR (FR GEAR)	
165	3-359-421-01	CLUTCH (REEL DISK)	
166	3-359-418-01	PULLEY (FR PULLEY)	

SECTION 6
ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- Items marked "★" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- If there are two or more same circuits in a set such as a stereophonic machine, only typical circuit parts may be indicated and capacitors and resistors in other same circuits may be omitted.

CAPACITORS:
MF: μF, PF: μμF.

RESISTORS
- All resistors are in ohms.
- F: nonflammable

COILS
- MMH: mH, UH: μH

SEMICONDUCTORS
In each case, U: μ, for example:
UA...: μA..., UPA...: μPA..., UPC...: μPC, UPD...: μPD...

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

- WG: West Germany model

Ref.No.	Part No.	Description
901	*A-2006-250-A	(320)....MOUNTED PCB, AUDIO
	*A-2006-251-A	(520)....MOUNTED PCB, AUDIO
	*A-2006-301-A	(520S)...MOUNTED PCB, AUDIO
	*A-2006-302-A	(320S)...MOUNTED PCB, AUDIO
902	*1-634-840-11	(DECK A)...PC BOARD, MD (A)
	*1-634-843-11	(DECK B)...PC BOARD, MD (B)
903	*1-634-841-11	(DECK A)...PC BOARD, LEAF SW (A)
	*1-634-841-11	(DECK B)...PC BOARD, LEAF SW (B)
904	1-575-847-11	WIRE, FLAT TYPE (5 CORE)
905	1-575-779-11	WIRE, FLAT TYPE (5 CORE)
906	1-575-968-11	WIRE, FLAT TYPE (7 CORE)
907	1-575-781-11	WIRE, FLAT TYPE (9 CORE)
908	1-575-782-11	WIRE, FLAT TYPE (9 CORE)
909	1-575-784-11	WIRE, FLAT TYPE (13 CORE)
910	1-533-213-31	HOLDER, FUSE
911	⚠.1-569-007-11	(E)...ADAPTOR, CONVERSION 2P
912	⚠.1-551-188-XX	(E).....CORD, POWER
	⚠.1-551-506-XX	(US,Canadian)...CORD, POWER
	⚠.1-555-795-00	(AEP,WG).....CORD, POWER, EULO PLUG
	⚠.1-556-035-00	(UK).....CORD, POWER
913	1-548-596-31	COUNTER, TAPE (MIDDLE TYPE)
C11A	1-110-342-11	MYLAR 390PF 5% 50V
C11B	1-110-342-11	MYLAR 390PF 5% 50V
C12A	1-136-157-00	FILM 0.022MF 5% 50V
C12B	1-136-157-00	FILM 0.022MF 5% 50V
C13A	1-124-282-00	ELECT 22MF 20% 25V
C13B	1-124-282-00	ELECT 22MF 20% 25V
C14	1-136-273-91	FILM 75PF 5% 630V
C15	1-162-288-31	CERAMIC 330PF 10% 50V
C17	1-162-209-31	(520,520S)...CERAMIC 27PF 5% 50V
C17	1-162-288-31	(320,320S)...CERAMIC 330PF 10% 50V
C21A	1-110-342-11	MYLAR 390PF 5% 50V
C21B	1-110-342-11	MYLAR 390PF 5% 50V
C22A	1-136-157-00	FILM 0.022MF 5% 50V
C22B	1-136-157-00	FILM 0.022MF 5% 50V
C23A	1-124-282-00	ELECT 22MF 20% 25V
C23B	1-124-282-00	ELECT 22MF 20% 25V
C24	1-136-273-91	FILM 75PF 5% 630V
C25	1-162-288-31	CERAMIC 330PF 10% 50V
C27	1-162-209-31	(520,520S)...CERAMIC 27PF 5% 50V
C27	1-162-288-31	(320,320S)...CERAMIC 330PF 5% 50V
C31A	1-124-443-00	ELECT 100MF 20% 10V
C31B	1-124-443-00	ELECT 100MF 20% 10V
C32A	1-124-443-00	ELECT 100MF 20% 10V
C32B	1-124-443-00	ELECT 100MF 20% 10V
C33	1-124-119-00	ELECT 330MF 20% 16V
C51	1-130-729-00	(520,520S)...FILM 0.0027MF 5% 100V
C51	1-136-593-11	(320,320S)...FILM 0.0033MF 5% 100V
C52	1-130-729-00	(520,520S)...FILM 0.0027MF 5% 100V
C52	1-136-593-11	(320,320S)...FILM 0.0033MF 5% 100V
C53	1-130-339-00	FILM 0.0056MF 5% 100V
C54	1-136-562-11	(520,520S)...FILM 0.0082MF 5% 630V
C54	1-136-601-11	(320,320S)...FILM 0.01MF 5% 630V
C55	1-161-494-00	CERAMIC 0.022MF 25V
C56	1-124-925-11	ELECT 2.2MF 20% 50V
C57	1-124-791-11	ELECT 1MF 20% 50V
C58	1-162-282-31	CERAMIC 100PF 10% 50V
C71A	1-123-875-11	ELECT 10MF 20% 50V
C71B	1-123-875-11	ELECT 10MF 20% 50V
C72A	1-123-875-11	ELECT 10MF 20% 50V
C72B	1-123-875-11	ELECT 10MF 20% 50V
C101	1-126-301-11	ELECT 1MF 20% 50V
C102	1-136-157-00	FILM 0.022MF 5% 50V
C103	1-162-294-31	CERAMIC 0.001MF 10% 50V
C104	1-126-059-11	ELECT 10MF 20% 50V
C105	1-130-475-00	MYLAR 0.0022MF 5% 50V
C106	1-130-475-00	MYLAR 0.0022MF 5% 50V
C107	1-136-174-00	FILM 0.56MF 5% 50V
C108	1-136-171-00	FILM 0.33MF 5% 50V
C109	1-126-059-11	ELECT 10MF 20% 50V
C110	1-124-994-11	ELECT 100MF 20% 10V
C111	1-126-059-11	ELECT 10MF 20% 50V
C112	1-126-162-11	ELECT 3.3MF 20% 50V
C113	1-126-300-11	ELECT 0.47MF 20% 50V
C114	1-126-162-11	ELECT 3.3MF 20% 50V
C201	1-126-301-11	ELECT 1MF 20% 50V
C202	1-136-157-00	FILM 0.022MF 5% 50V
C203	1-162-294-31	CERAMIC 0.001MF 10% 50V
C204	1-126-059-11	ELECT 10MF 20% 50V
C205	1-130-475-00	MYLAR 0.0022MF 5% 50V
C206	1-130-475-00	MYLAR 0.0022MF 5% 50V
C207	1-136-174-00	FILM 0.56MF 5% 50V
C208	1-136-171-00	FILM 0.33MF 5% 50V
C209	1-126-059-11	ELECT 10MF 20% 50V
C210	1-124-994-11	ELECT 100MF 20% 10V

Ref.No.	Part No.	Description
C211	1-126-059-11	ELECT 10MF 20% 50V
C212	1-126-162-11	ELECT 3.3MF 20% 50V
C213	1-126-300-11	ELECT 0.47MF 20% 50V
C214	1-126-162-11	ELECT 3.3MF 20% 50V
C502	1-124-472-11	ELECT 470MF 20% 6.3V
C503	1-126-301-11	ELECT 1MF 20% 50V
C504	1-161-494-00	CERAMIC 0.022MF 25V
C505	1-126-161-11	ELECT 2.2MF 20% 50V
C506	1-126-059-11	(520,520S)...ELECT 10MF 20% 50V
C701	1-124-045-00	ELECT 4.7MF 20% 50V
C702	1-124-887-00	ELECT 3300MF 20% 16V
C703	1-124-887-00	ELECT 3300MF 20% 16V
C704	1-124-910-11	ELECT 47MF 20% 50V
C705	1-124-443-00	ELECT 100MF 20% 6.3V
C706	1-126-022-11	ELECT 47MF 20% 16V
C707	1-126-022-11	ELECT 47MF 20% 16V
C708	1-124-473-11	ELECT 1000MF 20% 10V
C709	1-124-473-11	ELECT 1000MF 20% 10V
C710	1-164-159-11	(320,320S)...CERAMIC 0.1MF 50V
C801	1-124-443-00	ELECT 100MF 20% 6.3V
C802	1-126-059-11	ELECT 10MF 20% 50V
C803	1-126-301-11	ELECT 1MF 20% 50V
C804	1-136-165-00	FILM 0.1MF 5% 50V
C805	1-136-165-00	FILM 0.1MF 5% 50V
C807	1-126-300-11	ELECT 0.47MF 20% 50V
C808	1-161-494-00	CERAMIC 0.022MF 25V
C901	1-161-494-00	CERAMIC 0.022MF 25V
CNP31A	*1-568-824-11	SOCKET, CONNECTOR 5P
CNP31B	*1-568-824-11	SOCKET, CONNECTOR 5P
CNP32A	*1-564-706-11	PIN, CONNECTOR (SMALL TYPE) 4P
CNP32B	*1-564-709-11	PIN, CONNECTOR (SMALL TYPE) 7P
CNP71A	*1-564-705-11	PIN, CONNECTOR (SMALL TYPE) 3P
CNP71B	*1-564-705-11	PIN, CONNECTOR (SMALL TYPE) 3P
CNP72A	*1-564-706-11	PIN, CONNECTOR (SMALL TYPE) 4P
CNP72B	*1-564-706-11	PIN, CONNECTOR (SMALL TYPE) 4P
CNP73A	*1-568-826-11	SOCKET, CONNECTOR 7P
CNP73B	*1-568-832-11	SOCKET, CONNECTOR 13P
CNP81A	*1-568-852-11	SOCKET, CONNECTOR 9P
CNP81B	*1-568-852-11	SOCKET, CONNECTOR 9P
CN501	*1-568-824-11	SOCKET, CONNECTOR 5P
CN502	*1-568-824-11	SOCKET, CONNECTOR 5P
CN504	*1-564-705-11	PIN, CONNECTOR (SMALL TYPE) 3P
CN701	*1-564-506-11	PLUG, CONNECTOR 3P
CN702	*1-564-337-00	PIN, CONNECTOR 3P
CN801	*1-568-828-11	SOCKET, CONNECTOR 9P
CN802	*1-568-828-11	SOCKET, CONNECTOR 9P
CN803	*1-568-832-11	SOCKET, CONNECTOR 13P
CN804	*1-568-826-11	SOCKET, CONNECTOR 7P
CN805	*1-564-505-11	PLUG, CONNECTOR 2P
D31	8-719-107-94	DIODE 1SS202-1
D101	8-719-107-94	DIODE 1SS202-1
D102	8-719-107-94	DIODE 1SS202-1
D201	8-719-107-94	DIODE 1SS202-1
D202	8-719-107-94	DIODE 1SS202-1

Ref.No.	Part No.	Description
D301	8-719-301-44	DIODE SEL2410E-D (L−∞)
D302	8-719-301-44	DIODE SEL2410E-D (L−10)
D303	8-719-301-44	DIODE SEL2410E-D (L−6)
D304	8-719-301-44	DIODE SEL2410E-D (L−3)
D305	8-719-301-38	DIODE SEL2210S-C (L 0)
D306	8-719-301-38	DIODE SEL2210S-C (L+3)
D307	8-719-301-38	DIODE SEL2210S-C (L+6)
D401	8-719-301-44	DIODE SEL2410E-D (R−∞)
D402	8-719-301-44	DIODE SEL2410E-D (R−10)
D403	8-719-301-44	DIODE SEL2410E-D (R−6)
D404	8-719-301-44	DIODE SEL2410E-D (R−3)
D405	8-719-301-38	DIODE SEL2210S-C (R−0)
D406	8-719-301-38	DIODE SEL2210S-C (R+3)
D407	8-719-301-38	DIODE SEL2210S-C (R+6)
D501	8-719-107-94	DIODE 1SS202-1
D502	8-719-200-77	DIODE 10E2N
D503	8-719-001-33	DIODE UZL-11L1
D701	8-719-200-77	DIODE 10E2N
D702	8-719-200-77	DIODE 10E2N
D703	8-719-200-77	DIODE 10E2N
D704	8-719-200-77	DIODE 10E2N
D705	8-719-200-77	DIODE 10E2N
D706	8-719-200-77	DIODE 10E2N
D707	8-719-107-94	DIODE 1SS202-1
D708	8-719-000-78	DIODE UZL-7L2
D709	8-719-933-33	DIODE HZS6A1L
D710	8-719-933-33	DIODE HZS6A1L
D801	8-719-107-94	DIODE 1SS202-1
D802	8-719-107-94	DIODE 1SS202-1
D901	8-719-301-38	DIODE SEL2210S-C (REC)
D902	8-719-301-52	DIODE SEL2810A-C (PAUSE)
D903	8-719-301-44	DIODE SEL2410E-D (PLAY)
D904	8-719-301-52	(520,520S)...DIODE SEL2810A-C (B FWD)
D905	8-719-301-52	(520,520S)...DIODE SEL2810A-C (B REV)
D906	8-719-301-38	DIODE SEL2210S-C (HIGH)
D907	8-719-301-38	DIODE SEL2210S-C (NORM)
D908	8-719-301-44	DIODE SEL2410E-D (PLAY)
D909	8-719-301-52	(520,520S)...DIODE SEL2810A-C (A FWD)
D910	8-719-301-52	(520,520S)...DIODE SEL2810A-C (A REV)
F701 ⚠	1-532-259-00	(E,AEP,WG,UK)...FUSE, TIME-LAG 1.6A
F701 ⚠	1-532-742-11	(US,Canadian)...FUSE, GLASS TUBE 1.6A
F702 ⚠	1-532-259-00	(E,AEP,WG,UK)...FUSE, TIME-LAG 1.6A
F702 ⚠	1-532-742-11	(US,Canadian)...FUSE, GLASS TUBE 1.6A
HP901	1-543-536-11	(320,320S DECK A)...HEAD, MAGNETIC (PLAYBACK)
HE901	1-543-535-11	(320,320S DECK B)...HEAD, MAGNETIC (ERASE)
HP902	A-2003-418-A	(520,520S DECK A)...BASE ASSY, HEAD
HRP901	1-543-537-11	(320,320S DECK B)...HEAD, MAGNETIC (REC/PB)
HRP902 HE902	A-2003-477-A	(520,520S DECK B)...BASE ASSY, HEAD (REC/PB/ERASE)
IC31A	8-759-111-44	IC UPC4570C-1
IC31B	8-759-111-44	IC UPC4570C-1
IC81A	8-719-939-23	PHOTO SENSOR GP2S09-C
IC81B	8-719-939-23	PHOTO SENSOR GP2S09-C
IC501	8-752-036-34	IC CXA1330S

Note:
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Replace only with part number specified.

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Ref.No.	Part No.	Description
IC502	8-752-033-61	(320,320S)...IC CXA1198AP
IC502	8-752-039-24	(520,520S)...IC CXA1398P
IC503	8-759-208-06	(320,320S)...IC TC4051BPHB
IC504	8-759-040-53	IC MC14053BCP
IC505	8-759-945-58	IC RC4558P
IC506	8-759-945-58	IC RC4558P
IC507	8-759-634-51	IC M5218AP
IC701	8-759-945-58	IC RC4558P
IC801	8-759-634-59	IC M50964-224SP
IC802	8-759-207-05	IC TA7272P
IC901	8-741-100-48	IC SBX1610-59
J501	1-565-258-11	JACK, PIN 4P (LINE IN/OUT)
J502	1-507-796-71	JACK (PHONES)
L11	1-410-780-11	INDUCTOR 27MMH
L21	1-410-780-11	INDUCTOR 27MMH
LPF101	1-236-087-11	FILTER, LOW PASS
LPF201	1-236-087-11	FILTER, LOW PASS
M901	X-3359-417-1	MOTOR ASSY
M902	A-2003-474-A	MOTOR (REEL MOTOR) ASSY
Q51	8-729-142-46	TRANSISTOR 2SC2001-LK
Q52	8-729-142-46	TRANSISTOR 2SC2001-LK
Q53	8-729-111-29	TRANSISTOR 2SD1616A-K
Q71A	8-729-820-16	TRANSISTOR 2SA1317-S
Q71B	8-729-820-16	TRANSISTOR 2SA1317-S
Q101	8-729-620-05	TRANSISTOR 2SC2603-EF
Q102	8-729-900-74	TRANSISTOR DTC143TS
Q103	8-729-620-05	(320,320S)...TRANSISTOR 2SC2603-EF
Q201	8-729-620-05	TRANSISTOR 2SC2603-EF
Q202	8-729-900-74	TRANSISTOR DTC143TS
Q203	8-729-620-05	(320,320S)...TRANSISTOR 2SC2603-EF
Q501	8-729-900-61	TRANSISTOR DTA114ES
Q502	8-729-900-61	TRANSISTOR DTA114ES
Q503	8-729-900-61	(320,320S)...TRANSISTOR DTA114ES
Q505	8-729-821-04	TRANSISTOR 2SA1317-STU
Q506	8-729-900-61	TRANSISTOR DTA114ES
Q507	8-729-900-61	TRANSISTOR DTA114ES
Q508	8-729-821-04	TRANSISTOR 2SA1317-STU
Q509	8-729-900-61	TRANSISTOR DTA114ES
Q510	8-729-821-04	TRANSISTOR 2SA1317-STU
Q511	8-729-821-04	TRANSISTOR 2SA1317-STU
Q701	8-729-620-05	TRANSISTOR 2SC2603-EF
Q702	8-729-920-98	TRANSISTOR 2SD1761-EF
Q703	8-729-900-89	TRANSISTOR DTC144ES
Q704	8-729-900-85	TRANSISTOR DTC144WS
Q705	8-729-920-97	TRANSISTOR 2SB1187-EF
Q706	8-729-920-98	TRANSISTOR 2SD1761-EF
Q801	8-729-900-80	TRANSISTOR DTC114ES
Q802	8-729-821-04	TRANSISTOR 2SA1317-STU
Q803	8-729-900-61	TRANSISTOR DTA114ES
Q804	8-729-821-04	TRANSISTOR 2SA1317-STU
Q805	8-729-620-05	TRANSISTOR 2SC2603-EF
Q806	8-729-620-05	TRANSISTOR 2SC2603-EF
Q807	8-729-620-05	TRANSISTOR 2SC2603-EF
Q808	8-729-620-05	TRANSISTOR 2SC2603-EF
Q809	8-729-620-05	TRANSISTOR 2SC2603-EF
Q810	8-729-620-05	TRANSISTOR 2SC2603-EF
Q811	8-729-620-05	TRANSISTOR 2SC2603-EF

Ref.No.	Part No.	Description
Q812	8-729-620-05	TRANSISTOR 2SC2603-EF
Q813	8-729-620-05	TRANSISTOR 2SC2603-EF
Q814	8-729-620-05	TRANSISTOR 2SC2603-EF
Q815	8-729-821-04	TRANSISTOR 2SA1317-STU
Q816	8-729-900-61	TRANSISTOR DTA114ES
Q817	8-729-801-84	TRANSISTOR 2SB1013-4
Q818	8-729-900-89	TRANSISTOR DTC144ES
Q819	8-729-801-84	TRANSISTOR 2SB1013-4
Q820	8-729-900-61	TRANSISTOR DTA114ES
R11A	1-247-881-00	CARBON 120K 5% 1/4W
R11B	1-247-881-00	CARBON 120K 5% 1/4W
R12A	1-249-405-11	CARBON 100 5% 1/4W
R12B	1-249-405-11	CARBON 100 5% 1/4W
R13A	1-247-882-11	CARBON 130K 5% 1/4W
R13B	1-247-882-11	CARBON 130K 5% 1/4W
R14A	1-249-426-11	CARBON 5.6K 5% 1/4W
R14B	1-249-426-11	CARBON 5.6K 5% 1/4W
R15	1-249-430-11	CARBON 12K 5% 1/4W
R21A	1-247-881-00	CARBON 120K 5% 1/4W
R21B	1-247-881-00	CARBON 120K 5% 1/4W
R22A	1-249-405-11	CARBON 100 5% 1/4W
R22B	1-249-405-11	CARBON 100 5% 1/4W
R23A	1-247-882-11	CARBON 130K 5% 1/4W
R23B	1-247-882-11	CARBON 130K 5% 1/4W
R24A	1-249-426-11	CARBON 5.6K 5% 1/4W
R24B	1-249-426-11	CARBON 5.6K 5% 1/4W
R25	1-249-430-11	CARBON 12K 5% 1/4W
R31A	1-249-409-11	CARBON 220 5% 1/4W
R31B	1-249-409-11	CARBON 220 5% 1/4W
R32A	1-249-409-11	CARBON 220 5% 1/4W
R32B	1-249-409-11	CARBON 220 5% 1/4W
R51	1-249-435-11	CARBON 33K 5% 1/4W
R52	1-249-435-11	CARBON 33K 5% 1/4W
R53	1-249-429-11	CARBON 10K 5% 1/4W
R54 ⚠	1-212-849-00	(520,520S)...FUSIBLE 4.7 5% 1/4W F
R54 ⚠	1-212-851-00	(320,320S)...FUSIBLE 5.6 5% 1/4W F
R71A	1-249-433-11	CARBON 22K 5% 1/4W
R71B	1-249-433-11	CARBON 22K 5% 1/4W
R72A	1-249-433-11	CARBON 22K 5% 1/4W
R72B	1-249-433-11	CARBON 22K 5% 1/4W
R73A	1-249-437-11	CARBON 47K 5% 1/4W
R73B	1-249-437-11	CARBON 47K 5% 1/4W
R74A	1-249-437-11	CARBON 47K 5% 1/4W
R74B	1-249-437-11	CARBON 47K 5% 1/4W
R81	1-249-414-11	CARBON 560 5% 1/4W
R82	1-247-818-11	(520,520S)...CARBON 300 5% 1/4W
R83	1-247-834-11	CARBON 1.3K 5% 1/4W
R84A	1-249-417-11	CARBON 1K 5% 1/4W
R84B	1-249-417-11	CARBON 1K 5% 1/4W
R85A	1-249-408-11	CARBON 180 5% 1/4W
R85B	1-249-408-11	CARBON 180 5% 1/4W

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Ref.No.	Part No.	Description			
R101	1-249-417-11	CARBON	1K	5%	1/4W
R102	1-249-433-11	CARBON	22K	5%	1/4W
R103	1-249-429-11	CARBON	10K	5%	1/4W
R104	1-249-421-11	CARBON	2.2K	5%	1/4W
R105	1-249-421-11	CARBON	2.2K	5%	1/4W
R106	1-249-421-11	CARBON	2.2K	5%	1/4W
R107	1-247-887-00	CARBON	220K	5%	1/4W
R108	1-249-423-11	CARBON	3.3K	5%	1/4W
R109	1-249-423-11	CARBON	3.3K	5%	1/4W
R110	1-249-428-11	CARBON	8.2K	5%	1/4W
R111	1-247-864-11	CARBON	24K	5%	1/4W
R112	1-249-414-11	CARBON	560	5%	1/4W
R113	1-249-417-11	(320,320S)...CARBON	1K	5%	1/4W
R114	1-249-429-11	(320,320S)...CARBON	10K	5%	1/4W
R115	1-249-421-11	(320,320S)...CARBON	2.2K	5%	1/4W
R115	1-249-426-11	(520,520S)...CARBON	5.6K	5%	1/4W
R116	1-249-428-11	(320,320S)...CARBON	8.2K	5%	1/4W
R117	1-249-431-11	(320,320S)...CARBON	15K	5%	1/4W
R117	1-249-429-11	(520,520S)...CARBON	10K	5%	1/4W
R118	1-249-429-11	CARBON	10K	5%	1/4W
R119	1-249-435-11	CARBON	33K	5%	1/4W
R120	1-249-433-11	CARBON	22K	5%	1/4W
R121	1-249-408-11	CARBON	180	5%	1/4W
R122	1-249-421-11	CARBON	2.2K	5%	1/4W
R123	1-249-429-11	CARBON	10K	5%	1/4W
R124	1-249-428-11	CARBON	8.2K	5%	1/4W
R125	1-249-427-11	CARBON	6.8K	5%	1/4W
R126	1-249-409-11	CARBON	220	5%	1/4W
R127	1-249-417-11	CARBON	1K	5%	1/4W
R201	1-249-417-11	CARBON	1K	5%	1/4W
R202	1-249-433-11	CARBON	22K	5%	1/4W
R203	1-249-429-11	CARBON	10K	5%	1/4W
R204	1-249-421-11	CARBON	2.2K	5%	1/4W
R205	1-249-421-11	CARBON	2.2K	5%	1/4W
R206	1-249-421-11	CARBON	2.2K	5%	1/4W
R207	1-247-887-00	CARBON	220K	5%	1/4W
R208	1-249-423-11	CARBON	3.3K	5%	1/4W
R209	1-249-423-11	CARBON	3.3K	5%	1/4W
R210	1-249-428-11	CARBON	8.2K	5%	1/4W
R211	1-247-864-11	CARBON	24K	5%	1/4W
R212	1-249-414-11	CARBON	560	5%	1/4W
R213	1-249-417-11	(320,320S)...CARBON	1K	5%	1/4W
R214	1-249-429-11	(320,320S)...CARBON	10K	5%	1/4W
R215	1-249-421-11	(320,320S)...CARBON	2.2K	5%	1/4W
R215	1-249-426-11	(520,520S)...CARBON	5.6K	5%	1/4W
R216	1-249-428-11	(320,320S)...CARBON	8.2K	5%	1/4W
R217	1-249-431-11	(320,320S)...CARBON	15K	5%	1/4W
R217	1-249-429-11	(520,520S)...CARBON	10K	5%	1/4W
R218	1-249-429-11	CARBON	10K	5%	1/4W
R219	1-249-435-11	CARBON	33K	5%	1/4W
R220	1-249-433-11	CARBON	22K	5%	1/4W
R221	1-249-408-11	CARBON	180	5%	1/4W
R222	1-249-421-11	CARBON	2.2K	5%	1/4W
R223	1-249-429-11	CARBON	10K	5%	1/4W

Ref.No.	Part No.	Description			
R224	1-249-428-11	CARBON	8.2K	5%	1/4W
R225	1-249-427-11	CARBON	6.8K	5%	1/4W
R226	1-249-409-11	CARBON	220	5%	1/4W
R227	1-249-417-11	CARBON	1K	5%	1/4W
R501	1-249-417-11	CARBON	1K	5%	1/4W
R502	1-249-434-11	CARBON	27K	5%	1/4W
R503	1-249-429-11	CARBON	10K	5%	1/4W
R504	1-247-864-11	CARBON	24K	5%	1/4W
R506	1-249-441-11	CARBON	100K	5%	1/4W
R507	1-249-417-11	CARBON	1K	5%	1/4W
R508	1-249-441-11	CARBON	100K	5%	1/4W
R509	1-249-427-11	CARBON	6.8K	5%	1/4W
R510	1-249-413-11	CARBON	470	5%	1/4W
R511	1-249-429-11	CARBON	10K	5%	1/4W
R512	1-249-413-11	CARBON	470	5%	1/4W
R513	1-247-870-11	CARBON	43K	5%	1/4W
R514	1-249-429-11	CARBON	10K	5%	1/4W
R515	1-249-429-11	CARBON	10K	5%	1/4W
R516	1-249-429-11	CARBON	10K	5%	1/4W
R517	1-249-433-11	CARBON	22K	5%	1/4W
R518	1-249-433-11	CARBON	22K	5%	1/4W
R519	1-249-427-11	(320,320S)...CARBON	6.8K	5%	1/4W
R519	1-249-418-11	(520,520S)...CARBON	1.2K	5%	1/4W
R520	1-249-433-11	CARBON	22K	5%	1/4W
R521	1-249-431-11	(320,320S)...CARBON	15K	5%	1/4W
R521	1-249-428-11	(520,520S)...CARBON	9.1K	5%	1/4W
R522	1-249-433-11	CARBON	22K	5%	1/4W
R523	1-247-858-11	CARBON	13K	5%	1/4W
R524	1-249-429-11	(520,520S)...CARBON	10K	5%	1/4W
R525	1-249-442-11	CARBON	510	5%	1/4W
R526	1-249-431-11	CARBON	15K	5%	1/4W
R527	1-249-405-11	CARBON	100	5%	1/4W
R528	1-249-405-11	CARBON	100	5%	1/4W
R601	1-249-438-11	(320,320S)...CARBON	56K	5%	1/4W
R602	1-249-440-11	(320,320S)...CARBON	82K	5%	1/4W
R603	1-247-882-11	(320,320S)...CARBON	130K	5%	1/4W
R604	1-249-439-11	(320,320S)...CARBON	68K	5%	1/4W
R605	1-249-435-11	(320,320S)...CARBON	33K	5%	1/4W
R606	1-247-872-11	(320,320S)...CARBON	51K	5%	1/4W
R611	1-247-883-00	(320,320S)...CARBON	150K	5%	1/4W
R612	1-247-878-00	(320,320S)...CARBON	91K	5%	1/4W
R613	1-247-881-00	(320,320S)...CARBON	120K	5%	1/4W
R614	1-247-876-11	(320,320S)...CARBON	75K	5%	1/4W
R615	1-249-437-11	(320,320S)...CARBON	47K	5%	1/4W
R616	1-249-439-11	(320,320S)...CARBON	68K	5%	1/4W
R621	1-247-887-00	(320,320S)...CARBON	220K	5%	1/4W
R622	1-247-881-00	(320,320S)...CARBON	120K	5%	1/4W
R623	1-249-440-11	(320,320S)...CARBON	82K	5%	1/4W
R624	1-249-436-11	(320,320S)...CARBON	39K	5%	1/4W
R625	1-247-872-11	(320,320S)...CARBON	51K	5%	1/4W
R626	1-249-439-11	(320,320S)...CARBON	68K	5%	1/4W
R641	1-249-441-11	(320,320S)...CARBON	100K	5%	1/4W
R642	1-249-437-11	(320,320S)...CARBON	47K	5%	1/4W
R643	1-249-439-11	(320,320S)...CARBON	68K	5%	1/4W
R644	1-247-870-11	(320,320S)...CARBON	43K	5%	1/4W

Ref.No.	Part No.	Description
R645	1-247-868-11	(320,320S)...CARBON 36K 5% 1/4W
R646	1-249-433-11	(320,320S)...CARBON 22K 5% 1/4W
R661	1-247-881-00	(320,320S)...CARBON 120K 5% 1/4W
R662	1-249-437-11	(320,320S)...CARBON 47K 5% 1/4W
R663	1-249-438-11	(320,320S)...CARBON 56K 5% 1/4W
R664	1-249-439-11	(320,320S)...CARBON 68K 5% 1/4W
R665	1-247-872-11	(320,320S)...CARBON 51K 5% 1/4W
R666	1-247-868-11	(320,320S)...CARBON 36K 5% 1/4W
R681	1-247-880-11	(320,320S)...CARBON 110K 5% 1/4W
R682	1-247-876-11	(320,320S)...CARBON 75K 5% 1/4W
R683	1-249-436-11	(320,320S)...CARBON 39K 5% 1/4W
R684	1-249-434-11	(320,320S)...CARBON 27K 5% 1/4W
R685	1-249-438-11	(320,320S)...CARBON 56K 5% 1/4W
R686	1-247-870-11	(320,320S)...CARBON 43K 5% 1/4W
R701	1-247-752-11	CARBON 1K 5% 1/2W
R702	1-249-425-11	CARBON 4.7K 5% 1/4W
R703	1-249-437-11	CARBON 47K 5% 1/4W
R704	1-249-437-11	CARBON 47K 5% 1/4W
R705	1-249-425-11	CARBON 4.7K 5% 1/4W
R706	1-249-425-11	CARBON 4.7K 5% 1/4W
R707	1-249-427-11	CARBON 6.8K 5% 1/4W
R708	1-249-419-11	CARBON 1.5K 5% 1/4W
R709	1-249-425-11	CARBON 4.7K 5% 1/4W
R710	1-249-419-11	CARBON 1.5K 5% 1/4W
R711	1-249-429-11	CARBON 10K 5% 1/4W
R712	1-249-417-11	CARBON 1K 5% 1/4W
R713	1-249-427-11	CARBON 6.8K 5% 1/4W
R714	1-249-427-11	CARBON 6.8K 5% 1/4W
R801	1-249-412-11	(520,520S)...CARBON 390 5% 1/4W
R802	1-249-412-11	(520,520S)...CARBON 390 5% 1/4W
R803	1-249-410-11	CARBON 270 5% 1/4W
R804	1-249-412-11	CARBON 390 5% 1/4W
R805	1-249-413-11	CARBON 470 5% 1/4W
R806	1-249-429-11	CARBON 10K 5% 1/4W
R807	1-249-421-11	CARBON 2.2K 5% 1/4W
R808	1-249-421-11	CARBON 2.2K 5% 1/4W
R809	1-247-903-00	CARBON 1M 5% 1/4W
R810	1-249-429-11	CARBON 10K 5% 1/4W
R811	1-249-422-11	CARBON 2.7K 5% 1/4W
R812	1-249-422-11	CARBON 2.7K 5% 1/4W
R813	1-249-422-11	CARBON 2.7K 5% 1/4W
R814	1-249-428-11	CARBON 8.2K 5% 1/4W
R815	1-249-421-11	CARBON 2.2K 5% 1/4W
R816	1-249-429-11	CARBON 10K 5% 1/4W
R817	1-249-429-11	CARBON 10K 5% 1/4W
R818	1-249-425-11	CARBON 4.7K 5% 1/4W
R819	1-249-434-11	CARBON 27K 5% 1/4W
R820	1-249-429-11	CARBON 10K 5% 1/4W
R821	1-249-434-11	CARBON 27K 5% 1/4W
R822	1-249-429-11	CARBON 10K 5% 1/4W
R823	1-247-895-00	CARBON 470K 5% 1/4W
R824	1-247-895-00	CARBON 470K 5% 1/4W
R825	1-249-425-11	CARBON 4.7K 5% 1/4W
R826	1-249-425-11	CARBON 4.7K 5% 1/4W
R827	1-249-409-11	CARBON 220 5% 1/4W
R828	1-249-409-11	CARBON 220 5% 1/4W
R829	1-249-409-11	CARBON 220 5% 1/4W

Ref.No.	Part No.	Description
R830	1-249-407-11	CARBON 150 5% 1/4W
R831	1-249-407-11	CARBON 150 5% 1/4W
R832	1-249-407-11	CARBON 150 5% 1/4W
R833	1-249-435-11	CARBON 33K 5% 1/4W
R834	1-249-413-11	CARBON 470 5% 1/4W
R835	1-249-413-11	CARBON 470 5% 1/4W
R836	1-249-429-11	CARBON 10K 5% 1/4W
R837	1-249-410-11	CARBON 270 5% 1/4W
R838	1-249-412-11	(520,520S)...CARBON 390 5% 1/4W
R839	1-249-412-11	(520,520S)...CARBON 390 5% 1/4W
R840	1-249-441-11	(520,520S)...CARBON 100K 5% 1/4W
R841	1-249-415-11	CARBON 680 5% 1/4W
R842	1-249-429-11	CARBON 10K 5% 1/4W
R843	1-249-437-11	CARBON 47K 5% 1/4W
R844	1-247-866-11	CARBON 30K 5% 1/4W
R845	1-249-434-11	CARBON 27K 5% 1/4W
R846	1-249-425-11	CARBON 4.7K 5% 1/4W
R847	1-247-862-11	CARBON 20K 5% 1/4W
R848	1-247-872-11	CARBON 51K 5% 1/4W
R850	1-247-872-11	CARBON 51K 5% 1/4W
R851	1-249-405-11	CARBON 100 5% 1/4W
R853	1-249-437-11	CARBON 47K 5% 1/4W
R854	1-247-866-11	CARBON 30K 5% 1/4W
R855	1-249-434-11	CARBON 27K 5% 1/4W
R856	1-249-425-11	CARBON 4.7K 5% 1/4W
R857	1-247-862-11	CARBON 20K 5% 1/4W
R858	1-247-872-11	CARBON 51K 5% 1/4W
R860	1-247-872-11	CARBON 51K 5% 1/4W
R861	1-249-405-11	CARBON 100 5% 1/4W
R862	1-249-429-11	CARBON 10K 5% 1/4W
R881	1-249-415-11	CARBON 680 5% 1/4W
R882	1-249-429-11	CARBON 10K 5% 1/4W
R901	1-249-407-11	CARBON 150 5% 1/4W
R902	1-249-409-11	CARBON 220 5% 1/4W
R903	1-249-411-11	CARBON 330 5% 1/4W
R904	1-249-413-11	CARBON 470 5% 1/4W
R905	1-249-415-11	CARBON 680 5% 1/4W
R906	1-249-417-11	CARBON 1K 5% 1/4W
R907	1-249-420-11	CARBON 1.8K 5% 1/4W
R908	1-249-407-11	CARBON 150 5% 1/4W
R909	1-249-409-11	CARBON 220 5% 1/4W
R910	1-249-411-11	CARBON 330 5% 1/4W
R911	1-249-413-11	CARBON 470 5% 1/4W
R912	1-249-415-11	CARBON 680 5% 1/4W
R913	1-249-417-11	CARBON 1K 5% 1/4W
R914	1-249-426-11	(520,520S)...CARBON 5.6K 5% 1/4W
R915	1-249-430-11	(520,520S)...CARBON 12K 5% 1/4W
R916	1-249-411-11	CARBON 330 5% 1/4W
R917	1-249-411-11	CARBON 330 5% 1/4W
RV12	1-230-498-11	(320,320S)...RES, ADJ, CARBON 47K
RV12	1-230-500-11	(520,520S)...RES, ADJ, CARBON 220K
RV11A	1-238-597-11	RES, ADJ, CARBON 1K
RV11B	1-238-597-11	RES, ADJ, CARBON 1K
RV21A	1-238-597-11	RES, ADJ, CARBON 1K
RV21B	1-238-597-11	RES, ADJ, CARBON 1K

Ref.No.	Part No.	Description
RV22	1-230-500-11	(520,520S)...RES, ADJ, CARBON 220K
RV22	1-230-498-11	(320,320S)...RES, ADJ, CARBON 47K
RV71A	1-238-600-11	RES, ADJ, CARBON 10K
RV71B	1-238-600-11	RES, ADJ, CARBON 10K
RV72A	1-238-600-11	RES, ADJ, CARBON 10K
RV72B	1-238-600-11	RES, ADJ, CARBON 10K
RV101	1-238-016-11	RES, ADJ, CARBON 10K
RV201	1-238-016-11	RES, ADJ, CARBON 10K
RV501	1-241-058-11	RES, VAR, CARBON 50K/50K (REC LEVEL)
RV502	1-241-057-11	RES, VAR, CARBON 50K/50K (BALANCE)
RY31	1-515-726-11	RELAY
S81A	1-571-958-11	SWITCH, PUSH (1 KEY)(STOP)
S81	1-571-958-11	SWITCH, PUSH (1 KEY)(STOP)
S82A	1-571-281-21	SWITCH, LEAF (70EQ)
S82	1-571-281-21	SWITCH, LEAF (70EQ)
S83	1-571-281-21	SWITCH, LEAF (METEL)
S84	1-571-281-21	SWITCH, LEAF (REC A)
S85	1-571-281-21	(520,520S)...SWITCH, LEAF (REC B)
S86A	1-571-281-21	SWITCH, LEAF (HALF)
S86B	1-571-281-21	SWITCH, LEAF (HALF)
S701	1-571-305-11	SWITCH, PUSH (1 KEY)(POWER)
S901	1-572-358-11	SWITCH, SLIDE (DOLBY NR)
S902	1-572-358-11	(520,520S)...SWITCH, SLIDE (DIR MODE)
S903	1-554-596-21	SWITCH, KEY BOARD (A STOP)
S904	1-554-596-21	SWITCH, KEY BOARD (A FWD)
S905	1-554-596-21	(520,520S)...SWITCH, KEY BOARD (A REV)
S906	1-554-596-21	SWITCH, KEY BOARD (B REW)
S907	1-554-596-21	SWITCH, KEY BOARD (B FF)
S908	1-554-596-21	SWITCH, KEY BOARD (B REC)
S909	1-554-596-21	SWITCH, KEY BOARD (DUBBING HIGH)
S910	1-554-596-21	SWITCH, KEY BOARD (DUBBING NORM)
S911	1-554-596-21	SWITCH, KEY BOARD (B STOP)
S912	1-554-596-21	SWITCH, KEY BOARD (B PAUSE)
S913	1-554-596-21	SWITCH, KEY BOARD (B FWD)
S914	1-554-596-21	(520,520S)...SWITCH, KEY BOARD (B REV)
S915	1-554-596-21	SWITCH, KEY BOARD (B REC MUTE)
S916	1-554-596-21	SWITCH, KEY BOARD (A REW)
S917	1-554-596-21	SWITCH, KEY BOARD (A FF)
T51	1-433-337-11	(520,520S)...TRANSFORMER, BIAS OSCILLATION
T51	1-433-338-12	(320,320S)...TRANSFORMER, BIAS OSCILLATION

Ref.No.	Part No.	Description
T701 ⚠	1-449-661-21	(AEP,WG,UK)...TRANSFORMER, POWER
T701 ⚠	1-449-666-21	(E).....TRANSFORMER, POWER
T701 ⚠	1-449-420-21	(US,Canadian)...TRANSFORMER, POWER
VS901 ⚠	1-570-307-11	(E)...SWITCH, VOLTAGE CHANGE (VOLTAGE)
X801	1-577-358-21	VIBRATOR, CERAMIC (4MHz)

ACCESSORY & PACKING MATERIAL

	1-559-533-11	CORD, CONNECTION
*	3-350-829-31	(520)...INDIVIDUAL CARTON
*	3-350-829-41	(320)...INDIVIDUAL CARTON
*	3-350-829-51	(520S)...INDIVIDUAL CARTON
*	3-350-829-61	(320S)...INDIVIDUAL CARTON
*	3-354-917-01	CUSHION
	3-703-450-01	(US)...INSTRUCTION
	3-751-499-11	(Canadian,E,AEP,UK)...MANUAL, INSTRUCTION (English,French,Spanish,Portuguese)
	3-751-499-21	(US)....MANUAL, INSTRUCTION (English)
	3-751-499-41	(AEP)...MANUAL, INSTRUCTION (German,Dutch,Sweedish,Italian)
	3-751-499-51	(WG)....MANUAL, INSTRUCTION (German)

Note:	**Note:**
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

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